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ACORN USER

APRIL 1986

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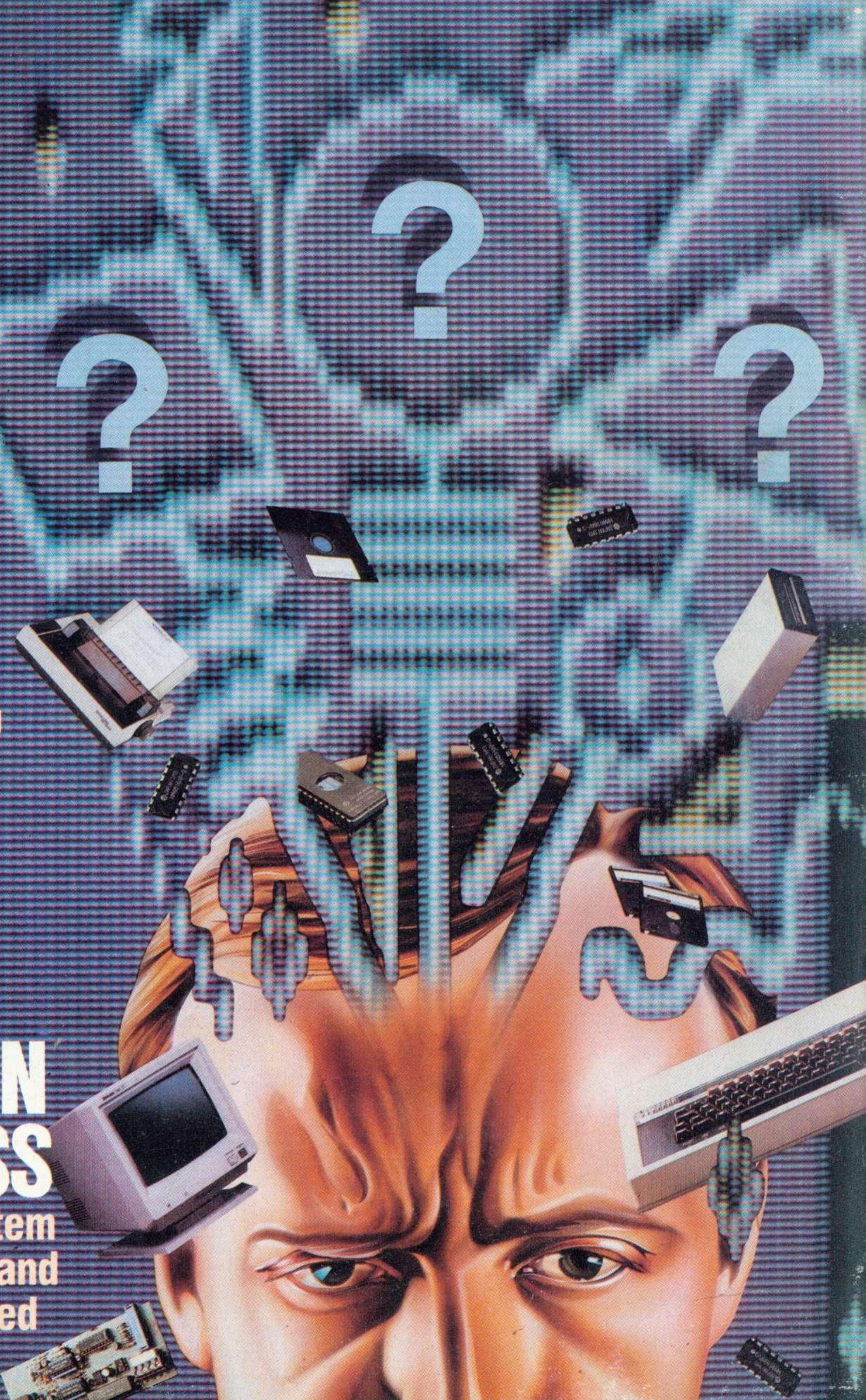
SPRAY PAINTING:
3D graphics without maths



£1500 BBC
music system must be won

ELECTRON USERS:
Take the pain out of programming

MASTER OPTIONS:
Our guide to system upgrades



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Choosing a system
Plus: Pear Tree and InterSheet tested



Once again Mushroom has answered a special need of all BBC computer users with their new WORKSTATION — no more untidy wiring, no more pulled plugs, transforms your system into a handsome console unit.

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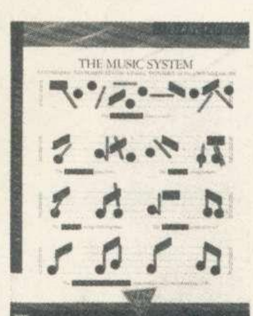
Those people already owning disc drives can have them fitted into the WORKSTATION. Prices on request.

Available direct from:
Mushroom Electronics, 55 Tavistock Street, Bedford, MK40 2RF
Telephone: (0234) 58303. Telex: 826112 MUSCOM G, and selected computer dealers nationwide.



The Punk is Dead Long Live The Music System

That notorious supporter of The Music System, The Punk, has passed on. His short life was spent in bringing your attention to the most advanced micro based music program for the BBC microcomputer. His last wish was that you should not miss out on the amazing facilities provided in The Music System for creating, editing, playing and printing tunes. He tried to indicate how simple the program is to operate despite its unrivalled versatility and performance. The Music System has editing facilities akin to a word processor and the sound designer module is quite out of this life. So bring life to your ears. Buy The Music System today.



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SYSTEM SOFTWARE

ACORNUSER

ISSUE No 45 APRIL 1986

NEW USERS

BUSINESS

EDUCATION

REVIEWS

INDEX

REGULARS

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ABC

FEATURES

COVER



Cover illustration by Paul Allen

NEW ADDRESS

Acorn User has moved offices. Our new address is Redwood Publishing, 142-143 Drury Lane, London WC2B 5TF. The phone number remains 01-836 2441.

NEXT MONTH

EDUCATION SPECIAL
Guide to software by subject and age range
How to set up a satellite ground station
Mandelbrot graphics and how to generate them
Faster data transfer on 6502 second processors

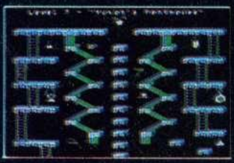
BOUNTY BOB STRIKES BACK!

Twenty-five Levels.

Multi Channel Music.

Dual Joystick Capability.

"Bounty Bob Strikes Back" is the sequel to "Miner 2049er" which was a huge success on the Commodore 64 and Atari machines. Now on the Amstrad, this version features Bob's toughest challenge to date and he needs your help more than ever before to guide him through the mine. The mutant organisms within have multiplied and over run the mine entirely, making it extremely difficult to survive the hazards of the underground passage-



ways. Using high powered special equipment in the twenty-five caverns is Bob's only hope of achieving his objective of securing the mine and defeating the evil plans of Yukon Yohan.

BEACH-HEAD

Multiscreen 3-D Arcade Action

A peaceful island is being held by a ruthless dictator and his troops. As Chief Commander of land and sea forces in the Pacific, you must obtain a quick naval victory and then invade the island with land forces. If your troops succeed in penetrating the island defence systems, the most difficult challenge still remains; capturing the enemy fortress of Khun-Lin.

Beach-Head is a multiscreen action game which requires different skills and provides new sequences as you progress through the game.



BRUCE LEE

Twenty secret chambers to explore

Unique multiple player options

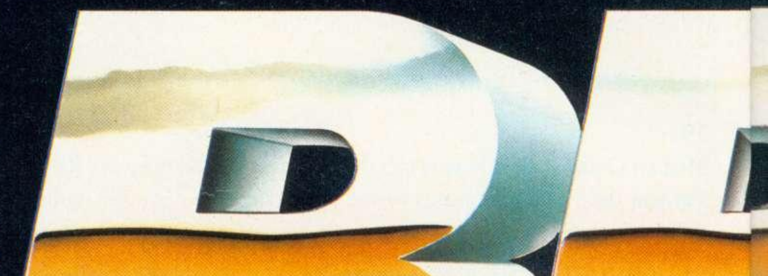
Dazzling graphics and animation

In "Bruce Lee" you will experience the power and the glory of Bruce Lee, one of the greatest masters of the martial arts.

As Bruce Lee, you will confront a barrage of vicious foes. You must penetrate the fortress of the Evil Wizard and claim his fortunes. Destroying the Wizard will earn you immortality and infinite wealth!



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RAID!

Gripping Arcade Action

Multiple 3-D Scrolling Screens

The scene is one of World-wide conflict. The only hope of saving the World from nuclear annihilation is an attack by stealth bombers on the launch sites.

As squadron leader, you must lead your troops on a virtual suicide mission; knock-out the launch sites, and proceed to the command headquarters. Armed only with the weapons you carry, you must destroy the defence centre and stop the attack!



DAMBUSTERS

Superb Graphics and Sound

At 21.15 hours on the evening of May 16th 1943, a flight of specially prepared Lancaster bombers left R.A.F. Scampton for Germany. And so, one of the most daring and courageous raids of the Second World War was underway. Now you have the opportunity to relive the drama and excitement of this famous action via your Amstrad computer. You will take the parts of Pilot, Navigator, Front and Rear Gunners, Bomb Aimer and Flight Engineer as you play this authentic reconstruction of the night's events. The multiple screen action is complemented by a comprehensive package of flight documents and authentic material from the period.

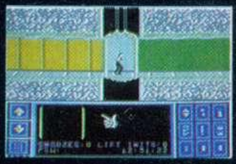


IMPOSSIBLE MISSION

Game of the Year 1985- British Micro Awards

Message from the Agency computer..... "....Your mission, Agent 4125 is to foil a horrible plot. From an underground laboratory, Elvin, the scientist, is holding the world hostage under threat of nuclear annihilation. You must penetrate his stronghold, avoid his human-seeking robots and find pieces of the security code.

Somersault over the robots or use a precious snooze code to deactivate them long enough to search each room. Use the Agency's computer to unscramble the



passwords from the code pieces, or try to solve them yourself. You'd better beware.....This mission is stamped IMPOSSIBLE!"

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YOU CAN PLAY THE GAME TOO!

*All screen shots as seen on the Commodore 64

NEWS



The Educational Software Company has developed a suite of 'talking' educational programs for use with its BBC Voice Box, a speech synthesiser linked to the Robin Light Pen (which produced the 'teddy' above).

The company claims the pen/speech system has enabled some children in special schools to communicate for the first time. It can also be linked to Logotron's implementation of Logo. Educational Software Company, 108 Parthenon Drive, Liverpool L11 7AQ.

Pop star prize

Budding pop stars can win a BBC micro based music recording system – worth £1500 – complete with Casio keyboard and UMI interface with software in this month's competition. See page 96.

Pen processor

PenDown is a chip-based wordprocessor for primary school children which includes a dictionary and font editor for £34. Logotron, Ryman House, 59 Markham Street, London SW3 4ND.

Acorn RISCs it on micro standard

French electronics giant Thomson and Acorn are set to decide in the next six weeks whether they will join forces on a European educational micro standard.

If they agree, backing will be sought from at least three governments and a micro could come out before the end of 1987.

Acorn boss Brian Long was unwilling to comment on progress, but stuck by a statement he made last year on a decision by May, 'I don't think my forecasting was that far off.'

One Acorn spokesman was prepared to add however: 'We are awaiting a decision, but are confident about our chances.'

Acorn is pushing its revolutionary 32-bit RISC (reduced instruction set computer) chip (*AU* October). Thomson has chosen the 16-bit 68000 chip set, used in Atari's ST.

The standard is theoretically independent of hardware, but the different approaches taken by the two companies could make it difficult to implement the other's system on different chip sets. Plus, Acorn will want to keep a large measure of BBC compatibility.

Thomson, Olivetti and Acorn got together last year to work on the standard (*AU* November). Under the plan, all three companies could manufacture micros around a common specification – and develop home and business machines. If they can't agree on a proposal, it will be all-out war in Europe giving the Japanese the chance to slip in with a new MSX standard, or the Americans.

Acorn's system is being developed in its Palo Alto research station in California's Silicon Valley. This group is writing the software using high-level languages ported onto the RISC as a second processor to a BBC micro.

The advantage of Thomson's bid is that it runs on a well-respected standard chip, and is liable to be cheaper. Acorn's offers a better specification however, and the Palo Alto group is already running a 6502 emulation giving access to BBC micro software. Also Thomson is likely to want RISC technology.

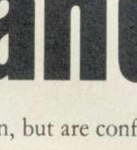
Meanwhile the BBC micro's advance into other parts of the world is continuing apace. Acorn is to supply Beebs to 105 Hong Kong schools, an order similar to one for Canada last year.

The British Council is putting on computer fairs in 20 countries this year with BBC micro hardware and software on show.

And Microvitec is following Acorn into India. An order for 1200 colour monitors has already been placed with more to follow.

At the recent High Technology in Education Show in London, the organisers claimed that over 5000 people came from abroad.

Games galore for Beeb and Electron



Software giant US Gold has begun converting its range of American chart-topping Commodore 64 games to the BBC micro and the releases are just a part of a sudden boom in games software for the Beeb.

The success of *Beach-Head* has prompted US Gold to convert more titles. *Dambusters*, *Bruce Lee*, *Bounty Bob*, *Raid!* and *Impossible Mission* will be £9.95 on cassette.

Melbourne House will release the BBC micro version of the *Lord of the Rings* adventure this month. The £15.95 adventure is text-only but a disc version is in preparation which will feature graphics.

Hewson has converted its steam locomotive simulator program, *Southern Belle*, for the Beeb and Electron price £7.95 on cassette.

Hot on the heels of *Way of the Exploding Fist* and *Yie Ah Kung Fu* comes Superior's martial arts title for BBC and Electron (£8.95).

Firebird, after a period when it produced no BBC micro material, will return with *Thrust* at £1.99.

Finally, Ultimate is to produce a compilation of its top-selling Beeb titles, all on one tape, in April.

PUBLISHER'S STATEMENT

In recent months regular readers will have noticed improvements to *Acorn User*. Extra resources have been committed to expand its scope and coverage, and improve its presentation.

With ever-rising production costs, the publishers have reluctantly decided to pass on some of these increases by raising the cover price by 5p. Even at this new price we are sure you will agree that *Acorn User* still delivers the best value among specialist computer magazines – 200 pages a month, including 16 full pages of listings – and less than the price of a good blank cassette.

This increase does not apply to the subscription price yet, so now's the time to subscribe to save money.

News in brief

● The Amstrad multi-user education networking system from Northern Computers can be linked to Acorn micros. As well as supporting the Amstrad CPC 464, 664, 6128 and PCW8256 machines, the network also supports the BBC B and BBC Basic. More information from Northern Computers, Churchfield Road, Frodsham, Cheshire WA6 6RD.

● Up-graded versions of Pagesoft's three suites of educational programs, *Stories, Scenes* and *Pageant*, are now available to past purchasers at £5 per suite, or £10 for all three. Pagesoft, 17 Pagefield Crescent, Clitheroe, Lancs.

● Business software house Gemini has licensed Watford Electronics to give away free copies of its *Office Mate* and *Office Master* with equipment such as disc drives.

Loyal fans fuel boom for used Beebs

User loyalty to the BBC micro has created a massive second-hand market – and provided a booming trade-in service.

Comp Shop, a dealer in north London, is selling used Beebs as well as exchanging old machines for the newer B+ and Master – when they can get supplies.

And the demand they see is confirmed by the popularity of *Acorn User*'s Free Ad pages for selling second-hand Beebs. There is a constant backlog of ads, and BBC micros are holding their prices well.

Karen D'Arcy at Comp Shop said they traded-in about 10 micros a week: 'Virtually all customers want to stick with the BBC machine. They are people who want the computer to make their lives easier rather than play around with fancy extras.

'Most had to learn about computing in the first place and don't want to go through all that hard work again!'

The main reason for upgrading she added was that people wanted the extra memory in the B+ and Master, and to have a new machine. D'Arcy recommends customers to take out all the extras such as ROM boards and sell them privately and then bring in the standard machine.

She added that there was a big waiting list to trade up to a Master from a BBC – they had only received five machines – and some people had gone from a model B to B+ and now wanted a Master.

The trade-in prices they quote are:

● BBC B without DFS, over two years old – £150.

● BBC B without DFS, under two years old – £200.

● BBC B with DFS, over two years old – £200.

● BBC B with DFS, under two years old – £250.

The company will also upgrade your BBC B to a B+ or B+ 128 model by swapping the circuit-board for a new one. Prices for the up-grades are BBC B with DFS to B+ – £100 (less than two years old) or £150 (more than two years old). Converting to a BBC B+ 128 adds on an additional £34 to these prices.

Second-hand Beebs with new power supply, keyboard and case range from £200 to £250.

More information from Comp Shop, 14 Station Road, New Barnet, Herts EN5 1QW.

Electron discounts revitalise market

Heavy discounting on the price of the Electron before Christmas – down to as little as £49.95 in some cases – has lead to a new lease of life for the machine with stores reporting a dramatic increase in customer demand for software for the micro.

This is already having a knock-on effect with more software houses producing material to run on the machine.

Melbourne House is to release a special Electron version of its chart topping *Way of the Exploding Fist*. It will be available shortly, price £9.95.

Substantial

Superior is converting its *Speech* utility for the Electron. *Speech* is a sophisticated speech synthesiser which includes a built-in allophone generator enabling it to work from ordinary English text. Electron *Speech* will be out in late spring, price £9.95.

Commented one industry source, 'The Electron does seem to have taken off and the market for software for the machine is now very substantial.

'A top Electron title now sells at least as well as middle-charting Spectrum software.'

Martin Brown at Gallup, which produces the Gallup/Microscope software charts agreed.

'There are noticeable signs of Electron software sales picking up,' he told *Acorn User*.



Fist: striking out for the Electron

Sing a song of music tutor software

If you want to learn to read music or play a musical instrument then your BBC micro can help you.

Music Master is a neat hardware/software add-on for the Beeb suitable for anyone learning to play the recorder and *Micro Musician* is a piano keyboard tutor.

The first consists of a microphone which attaches to the recorder, a device to measure pitch which connects between the microphone and the Beeb's user port and a suite of programs on disc.

As you play the recorder the *Music Master* will show on-screen the notes played in standard musical notation. Also, training programs play notes and sequences of notes on the Beeb which have to be matched on the recorder.

The package costs £50.49 (£45.90 for schools) from AB Electronics, AB European Marketing, Forest Farm Industrial Estate, Whitchurch, Cardiff.

Micro Musician connects either a Casio MT-36 mini music keyboard or a CT-102 full-size music keyboard to the Beeb via the user port. The package includes software to communicate and manipulate data from one to the other.

Notes played on the Casio are immediately displayed on-screen in conventional music notation. Having entered a tune you can then edit, play, save and load it.

Micro Musician costs £128.90 for the Casio MT-36 or £286.40 for the CT-120. Micro Musical, 37 Wood Lane, Shilton, Coventry.

MICRO MEDIA Computer Supplies

0707 52698 or 0707 50913 Rydal Mount, Baker Street, Potters Bar, Herts EN6 2BP

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EP 44	2.40	2.20	2.00
M 1009	4.00	3.70	3.40
HR 15 M/S	3.90	3.60	3.30
HR Fabric	3.90	3.60	3.30
CANON PW 1156A/1080	5.40	4.90	4.50
CANON Red Brown Blue	6.40	5.80	5.30
CENTRONICS G.L.P.	4.00	3.70	3.40
C. ITOH 8510/8510A	4.00	3.65	3.35
DAISYSTEP 2000 M/S	3.45	3.10	2.80
2000 Fabric	4.90	4.50	4.10
EPSON FX/MX/RX 80	3.50	3.25	3.00
Red Blue Brown	4.60	4.25	3.85
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LQ 1500	4.75	4.40	4.00
JUKI 6100 Multi-Strike	2.85	2.65	2.45
6100 Single Strike	1.70	1.55	1.40
2200 Fabric	3.50	3.35	3.10
2200 Single Strike	3.00	2.75	2.65
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KAGA KP810/910	5.40	4.90	4.50
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130/140/180	5.30	4.95	4.60
NEC PC 8023	4.00	3.65	3.35
OKI MICROLINE 80/82/83	1.70	1.60	1.45
182	9.65	9.00	8.40
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EL 1000/2000 M/S	9.10	8.00	7.50
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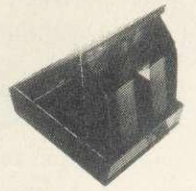


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Replacement Revs for Basic 1 users

Revs 4-Track, the disc or cassette of four extra racing circuits for Acornsoft's *Revs* motor racing simulation, will not run on BBC model Bs with Basic version 1.

A special version which will work with Basic 1 is available free in exchange for your old copy of *Revs 4-Track* from the Customer Services Department at Acorn.

To find out if you have a Basic 1 machine type in REPORT. A response of '(c) 1981 Acorn' is a Basic 1 machine.

'(c) 1982 Acorn' is given by all subsequent versions.

Pronto printing

Printer Manager is a BBC micro device which acts as a printer buffer, storing the program ready for the printer and freeing the micro for other tasks.

It can control the output from two or three computers to up to four printers.

The unit costs £295 plus VAT from Cambridge Microcomputer Centre, 153-154 East Road, Cambridge CB1 1DD.

Scottish repairs

Micro-Serv has become the first approved Acorn repair centre in Scotland. The company repairs BBC micros received either by mail or directly at their premises at 95 Deerdykes View, Cumbernauld, Scotland.

Low-cost sound sampler launched

The 'Barry Box' plugs straight into the BBC micro's 1MHz bus, and can sample any sound – music or speech – to record and store as a data string either in RAM or on disc for use in software.

Once digitised, a sound can be edited and its speed of play-back altered. Finally, the finished sound is stored in a file which can be called up and played back from either a Basic or assembly-language program.

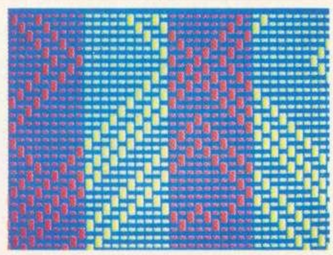
Digitally recorded sound takes up a lot of memory space so the sampling rate can be varied between 1500 and 40,000 samples a second. At a typical sampling rate, around 8k of RAM is required per second of sampled sound – the higher the sample rate, the higher the quality of the sound recorded and more memory is used.

The Barry Box will also display the sound sampled as a wave-form and there is an option to print out this pattern to an Epson compatible printer.

The complete unit with software in ROM costs £79.95.

Details from BML Electronics, Unit 24, Larch Grove, Bletchley, Milton Keynes MK2 2LL.

Beeb weaves its designs



Weaving is the latest craft to come under the spell of the BBC micro.

Harris Looms has a suite of disc software for pattern design and a slave processor hardware add-on for the loom itself enabling the design to be carried across and manufactured.

Explained Harris' managing director Bill Emmerich, 'Using the system you can take something like a scarf or a table cloth right through from the idea stage, and the design of the pattern and loom plan, to its implementation on the loom and the finished cloth.'

First, with the *Dobby Designer* program (£172.50), you can plan on the BBC micro's screen your fabric pattern and its repeat, and then view the finished design at different scales. From the final pattern design the program then works out what is called the 'lift sequence' needed to weave the pattern into cloth.



Harris Designer Loom station includes a 16 shaft 15in loom and BBC micro

This data is then sent, via the Beeb's RS232 communications port to the slave unit on the loom itself where up to five nine-step patterns can be held in the unit's battery backed-up memory.

The data is then used by the loom's on-board processor to control a series of electro-magnetic latches on the loom which set up the required weave for each row of the pattern. As the user steps through the weave row-by-row the loom automatically sets the pattern and the finished cloth is built up.

Refinements include a *Weave Analysis* program (£138), which sets up the weave pattern from any given design and allows more sophisticated pattern editing.

The automated loom systems cost between £613 for a four-shaft system and £1843 for a 24-shaft system. Two introductory teaching packages, *Weave Tutors 1 and 2*, cost £17.25 each. A bolt-on shaft-latch and data storage unit (£400) is available to convert a Harris Loom to be driven from the Beeb.

More details from Harris Looms, Emmerich (Burlon), Wotton Road, Ashford, Kent.

Electronic development software trio

Three companies have released sophisticated electronic circuit development software for use on the BBC micro.

Microspice, from Seasim Engineering Software, costs £99 plus VAT and will handle integrated circuit design including operating points, small AC signal analysis and noise contributions. Details from Seasim, The Paddocks, Frith Lane, London NW7 1PS.

Markie Enterprises' *AC Linear Circuit Analysis* at £60, is a menu-driven system capable of handling up to 30 circuit nodes and 372 components with a choice of six bi-polar transistors and FETs. More information from Markie, 17 Percy Road, Shepherds Bush, London W12.

Finally, Seal Electronics has a low-cost logic analyser for testing and debugging electronic circuits. It consists of a high-speed logic interface which plugs into the micro and software to control the unit and to turn the television or monitor screen into the front panel of the analyser.

The analyser costs £250, including interface, connecting cable, software on tape and manual, available from Seal Electronics, 1 Hagbourne Close, Woodcote, Reading RG8 0RZ.

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Universities choose chip design on Beeb

by David Kelly

Qudos – a custom chip design company led by an ex-Acorn director has won an order worth £150,000 to supply universities with systems based on the Beeb.

Its managing director is the former sales boss of Acorn, Peter O'Keeffe, and other top men include ex-Acorn glitterati Hermann Hauser and Andy Hopper.

Qudos stands for 'quick design on silicon', and that's just what the company offers. The Qudos team will design semi-custom chips to order and then produce them, mainly for research groups in industry and colleges.

Since October however, the sophisticated computer-aided chip design software developed by Qudos has been marketed as an ultra-low cost complete chip development system.

The software runs on a Master Turbo or on a BBC B with 6502 second processor operating either as a stand-alone system or as part of an Econet network. It allows quite complex chip designs of up to around 300 gates in size to be planned. The finished design is supplied on disc to Qudos.



Haroon Ahmed, Peter O'Keeffe and Andy Hopper – Andy explained ULAs in *AU* Sept '82

Three computer controlled electron-beam machines, using the data from the disc, then etch the chip design directly on to a silicon wafer at Qudos' Cambridge base. This method of chip manufacture – in this case using a Ferranti ULA (uncommitted logic array) is suitable only for pilot-scale chip production but has the advantage that it's very cheap, costing typically around £100 to produce first silicon. If the chip design is a success, the data can be switched from disc to magnetic tape for full scale commercial manufacture.

The system has been greeted with enthusiasm and the Universities Grants Committee, which has £25m to spend on computer-aided design equipment, has concluded a deal with Qudos to buy networked systems for 50 universities worth £3000 each.

'As a result, by the end of 1986 there will be 50 universities running teaching laboratories introducing thousands of under-graduates to designing semi-custom chips', explained Peter O'Keeffe. 'We hope our very low-cost system will seed the market for a new generation of chip designers.'

Sophisticated science suite for schools

Educational software recently released includes titles from Welsh company Highlight.

Highlight's titles feature three understanding language packages, *Entertaining English*, *Adventurous English* and *Crosswords*, at £7.95 each on disc or cassette, and the *Shapeway System*, a suite of software and hardware packages designed to turn the BBC micro into a sophisticated scientific device for measuring temperature, light intensity, voltage, timing, sampling and graphics plotting with auto-calibration. The *Shapeway System* costs £34.95.

Highlight is at 36 Sherbourne Close, Barry, South Glamorgan CF6 5AQ.

Acornsoft – back in the fold

Internal reorganisation at Acorn is now more or less complete, resulting in the incorporation of Acornsoft, previously a separate trading company, back under the wing of the main Acorn company.

All the staff remain, except Acornsoft's managing director David Johnson-Davies, who has been made redundant.

The moves mean that the programming teams are now distributed around Acorn.

'Acornsoft has effectively been melted down and reintegrated into Acorn', said an Acorn spokeswoman. She stressed that there was no question of Acorn ceasing to release software titles, although Acornsoft's publishing schedule has been considerably slimmed-down in recent months. The up-graded version of *Elite* for the 6502 second processor with colour, *Elite II*, has yet to appear and, apart from *Revs Four-track*, recent output has been low.

Sources within Acorn suggest that there are now few software development projects in progress, although it seems likely that the language cartridges produced for the Electron will be re-released in a slightly modified form for the new Master 128.

Serious

'There is no question of Acorn pulling out of the games software market', said the spokeswoman, 'although it is true Acorn is now more interested in the serious home user.

'If, however, there is an upsurge in the games market I think Acorn would react pretty fast.'

THE MAN FROM U.N.C.L.E.

Jumping Flash Jack Tramiel of Atari is doing a bit more cage-rattling, I see. A one megabyte RAM version of the ST for under £1000 with discounts being offered in the education sector on all models. Apparently he's also got his white coated vassals working long hours on a 'blitter' to make it even more super-duper. (A blitter is a cunning device which shifts chunks of data around memory very fast without using the main processor, and is all the rage.)

What effect will all this have on the mighty Master range? My guess is not a lot, if Acorn produces the goods on time and to specification. The high degree of compatibility with existing software plus the ability to expand in a variety of exciting directions make it difficult to beat. Having dug themselves well into this sector, it's going to take a fair few shells to dislodge Acorn.

There have been a few sniffy comments about the prices, but if you look at them closely they look pretty good value now. In a year's time they won't look so clever but Acorn may even break new ground and reduce them. (I did see a pig fly once.)

The protection fiends are at it again. The tape version of *Nightshade* from Ultimate won't run if you have a sideways ROM board in your machine. What's the point? It just makes hackers more determined and ordinary computer persons like myself more cheesed off. Who wins? The games companies must feel a bit ashamed since their ads and packaging never mention the fact that a fair proportion of Beeb owners will be wasting their money buying the damned thing.

News in brief

Cumana has produced two handbooks, for the BBC micro and Electron, detailing the operation of its popular disc drive and disc operating system.

They cover everything from basic technical specification, operating procedures and functions of data storage right through to a summary of DFS error messages.

The booklets are available free of charge, direct from Cumana at Pines Trading Estate, Broad Street, Guildford, Surrey.

The answer to infuriating computer crashes caused by mains interference could be the Mains Filter Adaptor from Duraplug Electricals. The device protects a computer from being adversely affected by voltage surges sometimes caused by electric drills, washing machines or vacuum cleaners. It costs around £18, available from most good electrical shops or direct from IML, Blair House, High Street, Tonbridge, Kent.

A Dutch user-group, specialising in all aspects of computer music on the Beeb – software, hardware, MIDI and Ampal – has been formed. The Ampal User Group Holland (AUGH) can be contacted at Karperdaal 58, 2553 PJ Den Haag, Netherlands.

MGA Microsystems has produced an ingenious device, called the Disk Doubler-B, which will transform any single-sided BBC micro 5.25in disc into a double-sided disc.

The simple punch-tool creates the write-enable notch on the edge of the disc and also the round index timing pulse holes necessary to allow it to be read from both sides. Disk Doubler-B costs £14.95 from MGA Microsystems, 140 High Street, Tenterden, Kent TN30 6HT.

Software and hardware developers can use micros specially set up at Acorn to test their software for compatibility. Also, a set of applications notes on the Master is available.

Publishing software spawns spin-offs

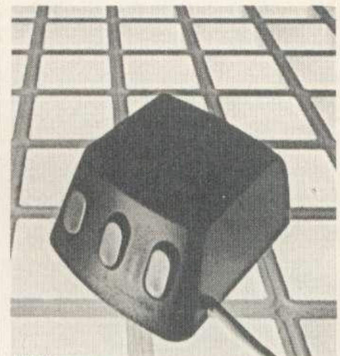
Publishing software based on the BBC micro looks set to spawn a whole new support industry. Two companies have jumped on to the AMX mouse-based *Pagemaker* offering picture digitising, and Ibbotsons Design Software has launched a rival to it.

The first is Thought Processors of Halifax with a service to produce illustrations on disc for inclusion in *Pagemaker* from photographic or video originals. The company will take any size colour or black-and-white print or any VHS video tape image, digitise it and save it as a file on disc, ready for adding to the *Pagemaker* program, for £1.50 (excluding disc and postage). Details from Thought Processors, 7-14 Greaves Place, Holywell Green, Halifax HX4 9BU.

If you want to go the whole hog and capture your own video images, from a video camera, recorder or television, then AMS and Watford Electronics have teamed up to offer their *Pagemaker* and Beeb Video Digitiser units at a combined price of £105 – almost two-thirds of the cost of the two items when bought separately. The Beeb Digitiser takes any source of composite video output and turns it into a digitised picture on disc in a form ready to be used by AMS's *Pagemaker* program.

The combination is called Magazine Maker and is available from Watford Electronics.

Once the digitised image, either from a Thought Processors' disc or from Watford's Beeb Digitiser, is added to the *Pagemaker* program it can be changed and manipulated in a variety of ways using the program's 'cut and paste', 'stretch', 'shrink', 'flip' and 'zoom' commands.


AMX mouse



The many faces of Terry Wogan manipulated by picture digitising

When the image has been processed as desired it can then be incorporated into a *Pagemaker* document and text can be formatted around the digitised image.

Finally, the finished A4 page can be printed out.

Rival

Ibbotsons Design Software has produced a rival software package to AMS's *Pagemaker*.

Its desk-top publishing program, *Imagina* has the advantage that it is designed to make the most of the additional memory and facilities offered by the BBC B+ 128 and Master.

In particular it offers advanced graphics handling making use of – and requiring – Acornsoft's *GXR* graphics extension chip, and will generate documents of more than one page in length.

It costs £59.80 including postage and VAT and is available on 40- or 80-track disc.

You can get further details from Ibbotsons Design Software, The Byre, Ecclesbourne Lane, Idridgehay, Derbys.

School database range grows

A database of information of use to teachers in special education has been set up on Prestel.

The Special Education Needs Database (SEND) contains 3000 pages of information providing valuable information relevant to teaching children with special educational needs, including details of software, hardware, news, conferences, exhibitions, books and courses. There is also a noticeboard facility to enable teachers in special schools to exchange information.

The SEND project began in 1983 as a joint DTI and SCET pilot project and now joins Prestel's other Education Specialist Databases: the School Link electronic magazine, Sign Post careers guide, Ed It information technology database and the Prestel Telesoftware service.

NOTICE BOARD

ON SHOW

- 25-27 March, Micros and Primary Education (MAPE) course and conference, Manchester Polytechnic. Details from Dave Whitehead, 550 Whitworth Road, Rochdale, Lancs OL12 0SW.
- 16-18 May, Electron & BBC Micro User Show, Royal Horticultural Hall, Westminster, London SW1. Admission: adults £3, under 16s £2.
- 7-9 July, Third Insurance Information Exchange, Connaught Rooms, London WC2. Specialist exhibition including hardware and software for the insurance industry. More details from Caroline Fletcher on 01-242 5275.
- 9 July, Computers in Science, Lancaster Polytechnic, Preston. This event, which is part of a course for further education teachers, will be open to the public. Potential exhibitors contact Mrs Minall at the Polytechnic's Business and Industrial Centre.
- 6-11 August, Festival Expo 86, Computers, Video Software and Games Exhibition, Stoke-on-Trent, Staffs. One of twenty exhibitions being held between May and October as part of this year's huge National Garden Festival. Over three million visitors are expected to visit the festival's purpose-built 180 acre garden site during the five months it is open.

FOR HELP

- To contact *Acorn User* authors, write to them c/o our new address: 142-143 Drury Lane, London WC2B 5TF.
- Remember you have until May 11 to register with the Data Protection Registrar if you are a business micro user who processes information about individuals. It costs £22 and failure to register is a criminal offence under the Data Protection Act, 1984.

  Contact the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX for advice and details.
- Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.
- Bulletin boards: information on 26 free-access boards was given in the October 1984 issue. Send 54p for photocopy.
- Monitor choice: photocopies of the review of four monitors, plus a set of nine test programs from the June 1984 issue cost 72p (inc post). A copy of the issue costs £1.25 (see page 104).

TO CONTACT

- Acorn, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.
- Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.
- Acorn's bulletin board service is Prestel-compatible (1200/75 baud) and runs on (0223) 243642.
- *Acorn User* cassette, discs, back issues and binders are available from PHS Mailings on (02934) 72208 (see page 104).
- *Acorn User's* page number on Micronet is 60043765. You can download *AU* software.
- BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).
- BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.
- British Amateur Radio Teleprinter Group (BARTG) specialises in keyboard communications including RTTY, AMTOR (Amateur Telex Over Radio) and packet radio. BARTG also provides terminal unit kits and other communications hardware. For more details contact: Stuart Dodson, BARTG Chairman, G3PPD, 63 Malvern Avenue, South Harrow, Middlesex.
- Bulletin Boards: Two new bulletin boards are now available. BB-BBS (Brecon Beacons Bulletin Board Service) offers free software and hints and tips. The board operates on 300/300 baud and is currently open between 8pm and 8am on (0874) 730692. On-Line Systems Bulletin Board gives details of Hartlepool Computer Services range of new and second-hand computers. It operates on both 300/300 baud and 1200/75 baud on (0429) 34346.

  Other boards: BB-BBS (0874) 730692; CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; Grendel (0532) 620334; HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; POT-BUG (0782) 503254; On-Line Systems (0429) 34346; Owltel (BBC Publications) 01-927 5820; Technomatic 01-450 9764; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200.
- MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA.
- MAPE (Micros and Primary Education), c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF.
- MUSE (Micro Users in Schools and Education), PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: (0482) 20268. User group for teachers and parents. Please send sae.
- National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN.
- CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA.
- Software Limited configure CP/M programs for the BBC micro. Write for a catalogue to No 2 Alice Owen Technology Centre, 251 Goswell Road, London EC1N 7JQ. Tel: 01-833 1173.

BLUNDERBOX

- Apologies for two bugs that crept into Tunemaker (March). Lines 710 and 1230 should read:

```
  710 IF notune% THEN PRINTT
AB(2,30)"NO TUNE IN MEMORY":
i%=INKEY(300):GOTO 750
 1230 IF key$="C" OR key$="c
" THEN PRINTTAB(32,5);SPC(5)
:INPUTTAB(32,5),tempo%
```

- Thanks to Jon Thackray for pointing out the error in the Master review on page 75 of the March issue. When specifying a filing system as part of a filename, the filing system name should be enclosed by hyphens, eg:

  100 LOAD "-DISC-PROGRAM"
- Sorry! Mike Rawlings' article Sideways Storage in March contained a number of errors.

  In the third paragraph on page 85 we stated listing 2 was the Tube compatible version – it should have read listing 3. And the caption to listing 2 on yellow page 114 should have read: 'Listing 2. A program for use on a Solidisk board'.

  On page 86, 10 lines from the bottom of the first column, the listing line numbers should have read 902 to 909 not 1100 to 1170. Alternative lines to adapt integer read/write routines to handle two byte or three byte variables were missed from the yellow pages and you'll find them here:

Listings 1 and 2 –two bytes

```
1240 !&90=t+n*2:?&92=bk:?&93=2:
!&94=v
1300 !&90=t+n*2:?&92=bk:?&93=2
1320 =!&94 AND&FFFF
```

Listings 1 and 2 – three bytes

```
1240 !&90=t+n*3:?&92=bk:?&93=3:
!&94=v
1300 !&90=t+n*3:?&92=bk:?&93=3
1320 =!&94 AND&FFFFFF
```

Listing 3 – two bytes

```
1930 !&255=t+n*2
1950 ?&258=2
2020 !&255=t+n*2
2040 ?&258=2
2060 =!&259 AND&FFFF
```

Listing 3 – three bytes

```
1930 !&255=t+n*3
1950 ?&258=3
2020 !&255=t+n*3
2040 ?&258=3
2060 =!&259 AND&FFFFFF
```

Listing 4 – two bytes

```
1930 !&250=t+n*2
1950 ?&258=2
2020 !&255=t+n*2
2040 ?&258=2
2060 =!&259 AND&FFFF
```

Listing 4 – three bytes

```
1930 !&250=t+n*3
1950 ?&258=3
2020 !&255=t+n*3
2040 ?&258=3
2060 =!&259 AND&FFFFFF
```



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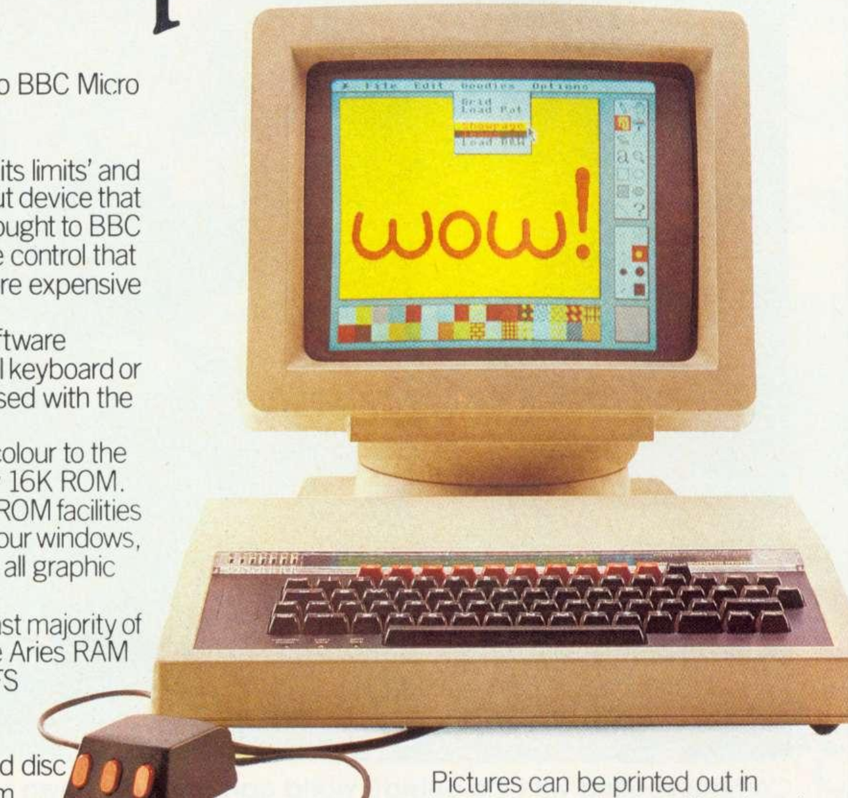
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ORDER NOW

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We thought it was about time we put you in the picture.



When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.

Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

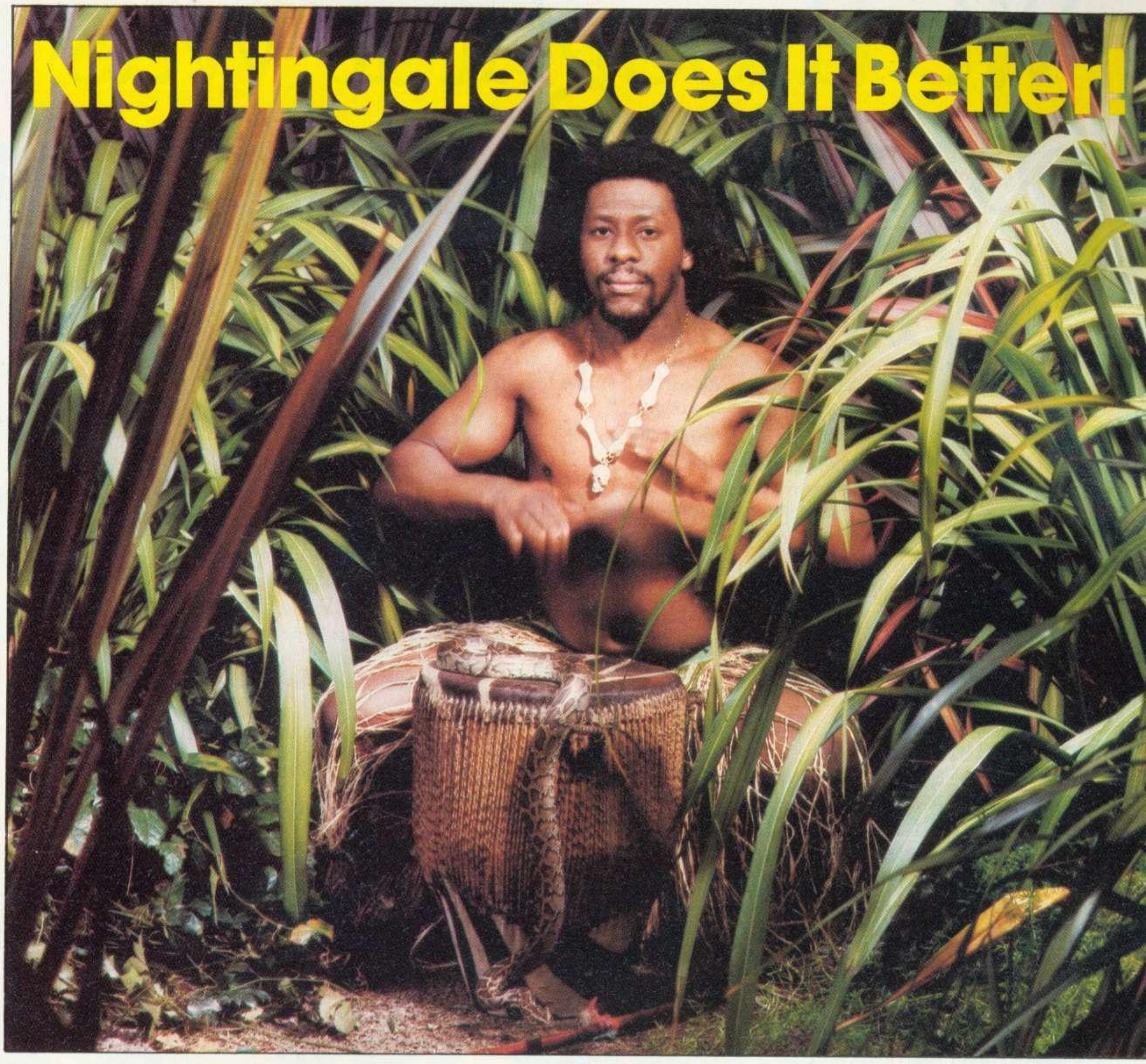
Then you'll really be 'in the picture'.



AMX MOUSE

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BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR PO TO ADVANCED MEMORY SYSTEMS LTD, FREEPOST, WARRINGTON WA4 1BR TELEX 628672 AMSG FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501



Communicating with the outside world can present its own special problems. Fortunately help is at hand for BBC users in the form of Nightingale and Commstar.

The Nightingale modem has become the standard by which others are judged. Combining simplicity of use with true multi-baud rate operation, Nightingale can provide access to both Viewdata (1200/75 & 75/1200 baud) and full duplex (300/300 baud) systems. Furthermore, Nightingale can be expanded to include auto dial/auto answer facilities with full software control.

Commstar THE communications software for the BBC, *is now better than ever!* The new enhanced version now available on a 16K Eprom is totally compatible with the new Master Series BBC computer. Commstar's features are too numerous to list here, so please ask for a fact sheet.

Available also for Commstar, is a Technical Appendix Manual for advanced users.



APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

Nightingale and Commstar are available direct from Pace or from good dealers everywhere.

Nightingale Modem	**£119.00**
Commstar	**£29.57**
Nightingale/Commstar Combination	**£139.00**
Commstar Technical Appendix	**£5.00**

Please add carriage and V.A.T. to the above prices.
P & P (U.K.): £0.75 with Nightingale £2.50.

Access VISA

Comprehensive fact sheets are available for these and other Pace products.

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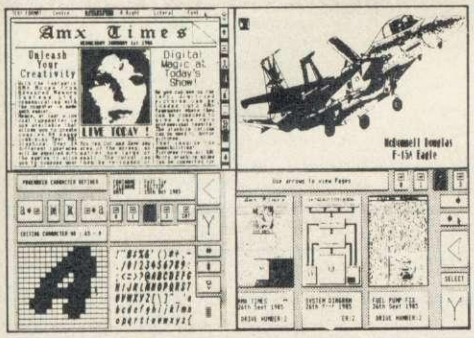
Now compatible with BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker – a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs – in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.



AMX Pagemaker is fully compatible with either the AMX Mouse – joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode 0, the highest graphics resolution on the BBC.



The program that's making front page news.

READ ALL ABOUT IT.

You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formating as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

The previewer allows you to view three A4 pages at any time, before work is output to a wide range of dot matrix printers including: Epson FX/RX/LX/LQ, Canon PW-1080, Kaga KP810, Mannesman Tally MT-80+, Seikosha SP-1000A, Star Delta, Star SG10. And any that are compatible with the above.

AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself.

Let's leave the last word to the press.

*"Pagemaker" is phenomenal – it lends itself to creating anything where text and graphics are involved – notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16 – bit micros until now, this product is worth every penny of £49.95."

* 'Educational Computing', January 1986.

This superb package is available from all good computer dealers or direct using the Freepost order form below.

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Gemini ⟹ 1 ⟹



The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.

Now compatible with most double density DFS's

"Excellent if you can afford it..." (ACORN USER Dec. '84)

Now You Can! ~~£129.95~~ **£79.95**

DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120, and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, −, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

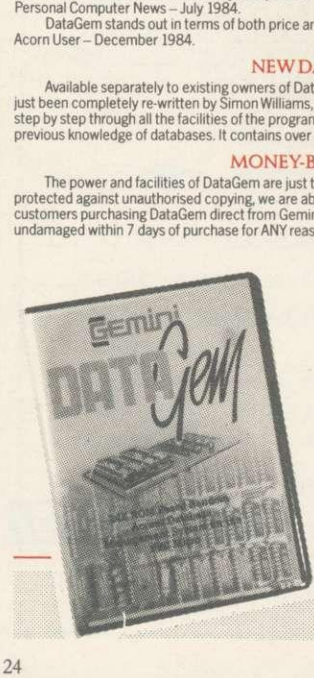
DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.



Now available – Wordwise Plus/DataGem MAILMERGE utility – see Gemini page 5!

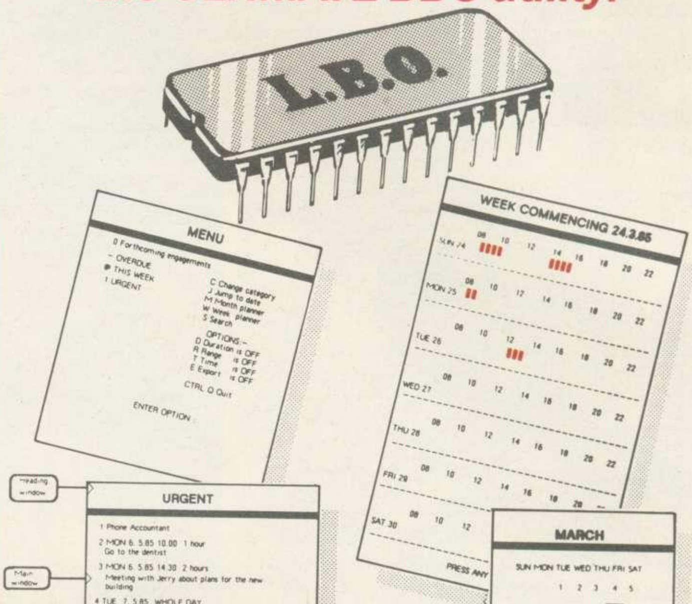
STOP PRESS!!

New DataGem owner's manual (see above) available separately at **£12.95** inclusive

Price refundable against purchase!

L.B.O. LIFE & BUSINESS ORGANISER

– the ULTIMATE BBC utility!



A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

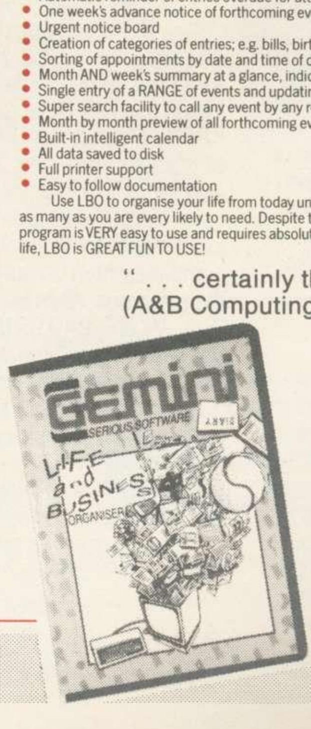
LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

" . . . certainly the best of its kind on the market. (A&B Computing, March '86)"



L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95. QL version also available now, MS-DOS version early 1986.

Gemini 2

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD -BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD -CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

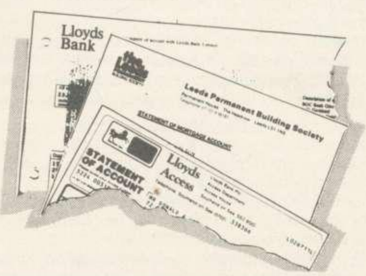
DDD -PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
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- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

Now a Gemini Best-Seller

MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:
(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

ONLY £12.95 Highly Recommended

Gemini 3

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!



• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT, will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money! (Price if purchased individually - £79.80 – save £67.80 with this pack) Electron version available, pack contains Database, Beebplot, Beebcalc, Home Accounts, Cassette only.

OFFICE MATE £12 Cassette or Disk



• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER £25 Cassette or Disk

Gemini 4

INTEGRATED ACCOUNTING FOR DISK USERS

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated . . . for example, when typing an invoice manually, the typist could type £14.25 instead of £42.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation . . . although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket . . . and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience. We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical . . . badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by HCCS Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which makes a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 40 track disk system and up to 610 customers on a 80 track disk per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes.

Price £69.95

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report, Evaluation stocks list, giving stock sales and cost values, Dormant parts report, Delete parts report, Stock usage report, Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file.

Price £69.95

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of supplier's invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file.

Price £69.95

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • Nominal accounts all of which are user definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details, Journal printouts, Trial Balance, Trading and Profit and Loss Account with notes, Balance Sheet with notes, Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes.

Price £69.95

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting including tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containing: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer, National Insurance contribution for employer and employee, Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. • Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file.

Price £69.95

INDEPENDENT PRESS COMMENTS

". . . This is the newest and most exciting . . . to have achieved a SUBSTANTIAL degree of INTEGRATION, very RAPID file ACCESS and respectably LARGE file SIZES, without the use of a second processor, it is a fine achievement. As one would expect from GEMINI, the individual modules are EMINENTLY PROFESSIONAL and for the first time present the single processor BBC as a viable small business computer . . . for a FULL range of business functions buy GEMINI'S Integrated Accounting package . . . a SUPERB example of the programme's art . . . GEMINI in particular pay careful attention to security:
offering copious advice on backing up discs, screen warnings when discs are nearly full and a password so that unauthorised persons cannot study your most intimate secrets . . ."
Jon Vogler – A&B Computing – December, 1984.

"The GEMINI system does the job . . . SIMPLY and COMPETENTLY. It works in a manner that ANY book-keeper would be able to master in no time at all." *Acorn User.*

"A VERY PROFESSIONAL piece of software." *Which Micro*

"Well documented, EASY to load, EXCELLENT screen display." *Home Computer Weekly.*

"The nominal ledger is particularly useful to the accountant as the journal entry facility is a strong feature of the package.
. . . if you or your client needed to run these programs then a fully integrated accounting system can be purchased at a cost significantly less than those that run IBM compatibles and at a level of friendliness rarely found in computer software."
Accountants Record – October, 1985.

NEW LOW PRICE

Price £69.95 per Module



Includes 1 year software support

DATAGEM/WORDWISE + MAILMERGE

At last comes the utility to take data from DataGem and merge it automatically with files created from Wordwise Plus. This utility, written in the Wordwise Plus programming language, is an absolute MUST for DataGem owners, and is highly recommended by Gemini who are now using it for their mail order operation. Any data contained within DataGem fields may be transported to any position within a WW + file, and selection of the appropriate parts of names etc is automatic. For details of DataGem, the definitive BBC database ROM, see page 1 of the Gemini advert.
Price – **£19.95** with all documentation, or just **£9.95** when purchased together with Wordwise Plus. Remember, all Gemini prices quoted except for hardware INCLUDE VAT and post/packing.

WORDWISE PLUS

The first competitor's software we have ever stocked. In our view, simply the best word processor you can buy for the BBC. Recommended for DataGem owners who may purchase MAILMERGE at **£9.95** when ordering WW + .
Price – **£49.95**

DATAGEM/WORDWISE + / MAILMERGE BUNDLES PACKAGE

Ideal package for the disk user requiring a powerful database, word processor and mail merging facilities.
All 3 – **£129.95**

GEMINI STAND-ALONE PAYROLL (Non-integrated)

A long-standing and best-selling Gemini business package providing all the necessary facilities for calculation of payrolls of up to 40 employees. Ideal for use in conjunction with SSP package as above. May be obtained on cassette or disk (please specify). Full update facility available allowing for legislation changes.
Price – **£39.95**

DISK-BASED MAILING LIST

The disk-based upgrade to the standard Gemini Mailist. An absolute must for disk users, this powerful mailist uses random filing for the storage and manipulation of up to 2000 names and addresses per file. See 'Office Master' details on Gemini page 3 for standard mailist, but this one will print up to three labels across, and will spool data out for word processor manipulation. Comes complete with utility to take your existing Gemini mailist data files and convert them to the new format. Key field feature for lightning fast sorts and searches. Very highly recommended and now reduced in price.
Price – **£24.95**

'PROTECTOR' ROM

This ROM is designed to make confidential disk data secure, and unavailable to those without the required password. It should be considered by all who are using and storing data of a confidential nature. 'PROTECTOR' encrypts the disk's password prior to storing, removing the possibility of anyone reading the password directly. An interface has been provided between the DFS and the user, to ensure complete compatibility with existing software. The system restricts access to disk based information provided the disk has been formatted to 'PROTECTOR'S' requirements. (The system includes the relevant formatter). A disk formatted in this way can be read by a BBC micro which has not been fitted with a 'PROTECTOR' ROM, although the PASSWORD information will be unintelligible. A password may be extracted from a disk if forgotten, by way of a utility supplies on a master disk with the package. The master disk itself may be protected if required. After three failed attempts to enter a valid password, the computer 'crashes', and a hard reset is necessary. Other facilities include the extension of DFS commands DUMP, LIST and TYPE. 'PROTECTOR' requires ACORN DFS 0.90 or 1.20.
Price – **£24.95**

VERTICAL MARKET PACKAGES

Hotel front desk and billing
Insurance/morgage broker
Estate agent.
Please enquire for details.

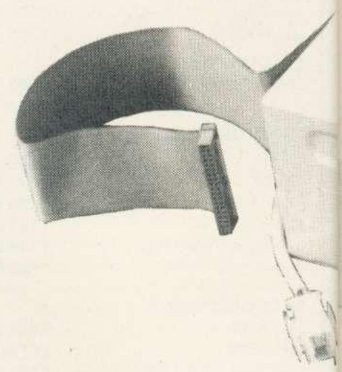
SSP PACKAGE – STATUTORY SICK PAY

This business software has been designed with the prime objective of providing the end-user with a total package which meets the new and complicated SSP requirements due to come into force with effect from 6th April 1986. Facilities include:

* Automatic assessment of SSP payments for any period to a maximum of 31 days.
* Control of linked Periods of Incapacity to Work (PIW's).
* Automatic cumulative control of both SSP monies and number of weeks paid during the current financial year and latest (single/linked) PIW.
* Issue of warning to raise SSP Termination SSP1(T) and SSP Exclusion SSP1(E) forms.
* History recording.
* Audit trail.
* Hard copy output for full file, selective SSP for individual, SSP payment details for a selected tax pay period for input to the payroll system, and cumulative SSP details to date or for DHSS P35 returns.
* Preparation utility for start of financial year.
* Requires printer and disk filing system.

Price – **£39.95**

SOLIDISK WINCHESTER FOR SINGLE AND NETWORK USERS



The Solidisk Winchesters provide highly efficient storage for BBC computers — at present the Model B and B Plus, and Acorn Second Processors — and soon the new Master Series.

The Winchesters are supplied with both the Solidisk Disc Filing System (DFS) and Advanced Disc Filing System (ADFS) in ROMs. These are fast and reliable, and have full facilities to move files between them.

The Solidisk DFS can use floppy discs in single or double density. Moreover, it can read from, and write to (IBM) PC-DOS and MS-DOS discs (but not format them or add entries to their directories). It also has a good 8271 emulator to run most protected disc software — both games and business — from Acornsoft, Alligata, Beebug, Clares, Island Logic, Micro Power, Superior Software etc.

It is intended for use with one or two floppy disc drives, and allows an unlimited number of filenames, rather than the standard 31. However, it is still limited to a file length of 256K and a maximum of 5 files open at once. Hence the DFS is inadequate for database and accounting applications — for which the ADFS is ideal. Moreover, the catalogue is single level.

Winchesters for single users

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to 512 Megabytes (or the drive size limit) in length. Up to 10 files can be open at the same time, and essentially unlimited numbers can be organised in a multi-level catalogue. The ADFS is also much faster acting, and files can grow in place without risk of 'Can't extend'.

Operating systems such as CP/M (Z80) and Panos (32016) can use either the DFS, to control only floppy disc drives, or ADFS, to control both these and Winchesters. Furthermore, the ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M, Panos etc., as well as the normal ADFS. The powerful Acorn 32016 comes with the "Install" program which will move Panos from the system floppy disc to the Winchester. Panos is first started under the Solidisk DFS or Acorn DNFS, then Install is run. Thereafter, Panos can be booted from the Winchester. Moving files between the floppy discs (DFS format) to the Winchester (ADFS format) is done by the Panos COPY command.

The Acorn Z80 Second Processor as supplied will only allow BBC Basic (Z80) to take advantage of the ADFS, and hence the Winchester. To run CP/M, a new BIOS ROM is required.

Winchesters for small networks

The existing Net Filing System (NFS) lacks local buffering. For example, each byte transmitted using BGET or BPUT requires four "frames" (or packets).

Solidisk will soon introduce the Net-Disc Filing System (NDFS). This, although using the standard Econet hardware, implements a direct link between any work station and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed. In addition, the NDFS allows up to 10 channels to be open, and files to be transmitted in blocks of 256 bytes, rather than character by character.

This NDFS is also suitable to network 32016 and Z80 Second Processors.

The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives. In business, sharing and transferring files over a network is much more practical than swapping floppy discs between machines.

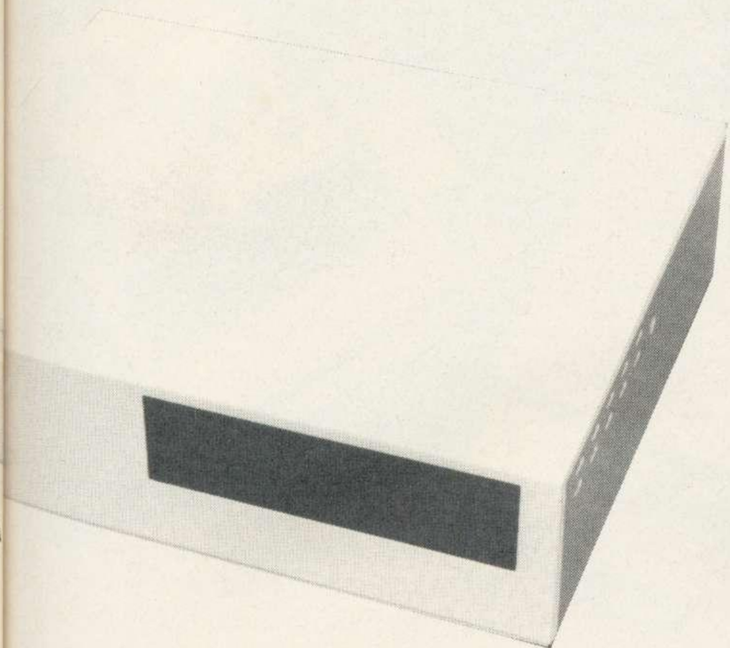
Winchesters for level 2 file servers

A sizeable proportion of BBC software runs only under the DFS. Solidisk has therefore developed the Winchester Disc Filing System (WDFS), to emulate multiple floppy disc drives on a Winchester. The latter is normally controlled by the ADFS, but for the WDFS, a "partition" is initially created in the root directory. This contains up to 100 "virtual drives", each of 200K, for use only by the WDFS. Like the real floppy drives, they can be given any number from 0 to 99.

The Solidisk WDFS enables the Econet Level 2 File Server to use Winchesters, which dramatically improves both speed and capacity.

The Winchester is very fast acting, and data written to the Winchester benefits from the in-built "Read after Write" for improved reliability.

To use the Solidisk Winchester with the Level 2 File Server, the Solidisk ADFS and WDFS ROMs are simply fitted to the right of the Acorn DNFS ROM in the file server machine, and the Winchester plugged into the 1MHz bus connector. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.



THE SOLIDISK WINCHESTER RANGE

It is easy enough to compare specifications and prices of Winchester drives, but there is more to it than that. Solidisk has a policy of continuous development, which is reflected in the broad range of applications supported. This, in turn, ensures the maximum return for your investment.

The Solidisk Winchesters are available in the following packages:

1) **10 Megabytes,** 5.25ins, Beeb powered £499.00
2) **10 Megabytes,** 5.25ins, mains powered £569.00
3) **20 Megabytes,** 5.25ins, Beeb powered £661.25
4) **20 Megabytes,** 5.25ins, mains powered £747.50
5) **20 Megabytes,** 3.50ins, Beeb powered £720.00
6) **40 Megabytes,** 3.50ins, mains powered £1148.85

Delivery by courier £10.00
All prices include VAT.

The packages include:

— The Winchester drive itself.
— DFS (or WDFS on request) and ADFS ROMs.
— One utility diskette in 5.25 inch, 160 track, ADFS format.
— Manuals for both ROMs and diskette.
— One year guarantee.

5.25 inch Winchesters

These drives (of 10 or 20 Megabytes formatted) are of established design, low noise, low power consumption, and have the same "form factor" as a half-height floppy drive. They can be fitted into the Solidisk CPU case in place of a floppy drive if required.

3.5 inch Winchesters

These are of the latest technology, featuring even lower noise and power consumption in an even smaller package. The drives have the same form factor as a 3.5 inch half-height floppy drive and a smaller footprint than the "User Guide"!

Beeb powered or mains powered

The Beeb powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply. The power lead will also support a single floppy disc drive.

If the machine is already supporting twin floppy disc drives, or many add-ons, a mains powered Winchester should be specified.

TWO KEY ADVANTAGES of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removable, rotating continuously at high speed (3600rpm), enabling data to be transferred 20 times faster than single density floppy discs.

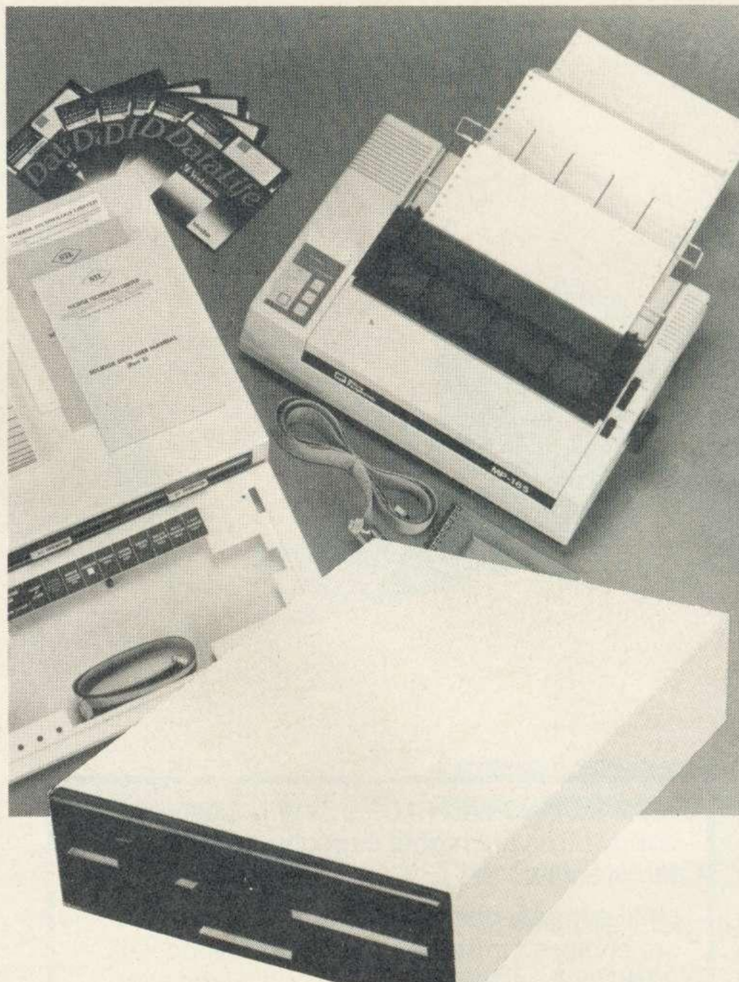
The Solidisk Winchester drives have a further advantage over some competitors. They have "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one tenth of some other drives.

This is specially important as the Winchester fills up.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus, or a BBC Model B, fitted with a 1770 disc interface (Acorn or Solidisk). If you already have the 8271 Disc Interface in your machine, we recommend replacing it with the Solidisk 8271 + 1770 disc interface rather than just the 1770 disc interface. The Winchester drive is connected to the 1MHz bus socket.

SOLIDISK DISC INTERFACES



Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.

The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

The Solidisk 1770+8271 Disc Interface

If you already have an 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at the flick of a switch. The 1770+8271 Interface is supplied with Solidisk Advanced Disc Filing System (ADFS). This is a 32K ROM set, available in two 16K or one 32K ROM and contains both DFS and ADFS.

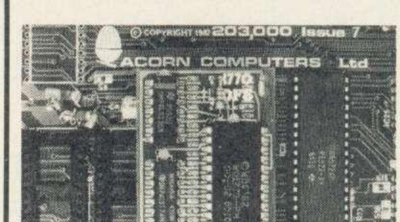
Features built into ROM	DFS 2.2	ADFS
Disc formatter	yes	yes
Disc verifier	yes	yes
Memory editor	yes	yes
Disc sector editor	yes	yes
Disc copier	yes	yes
Recover & Restore	yes	yes
Read track & Write track	yes	yes
Run 8271 floppy disc controller	yes	no
Osword 7F emulator for 1770	yes	yes
Tape to disc	yes	yes
Download	yes	yes
DFS files to ADFS	no	yes
ADFS files to DFS	no	yes
40/80 switching for 80-track drives	yes	only in DFS
Solidisk Winchester	no	yes
6502, Z80 and 32016 compatible	yes	yes
Read & Write IBM-PC DOS discs	yes	yes

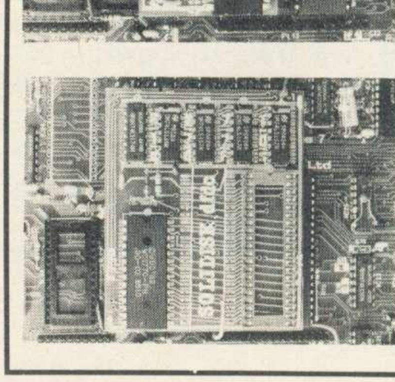
Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00





The Solidisk Floppy Disc Drives

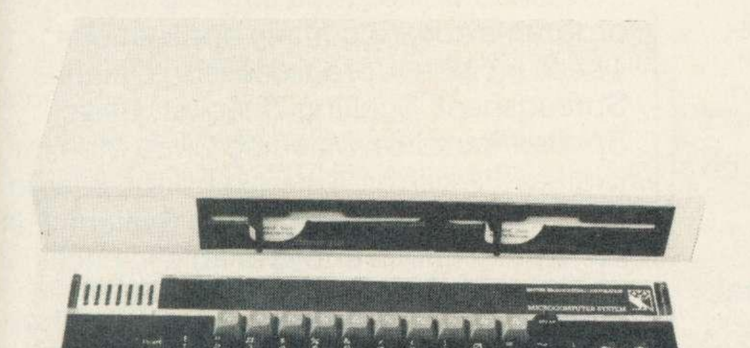
Solidisk floppy disk drives are 80-track, double-sided, 5¼ inch with capacity of one Megabyte unformatted (640K formatted with Solidisk double density DFS or ADFS). They are enclosed in strong steel casings to protect the mechanism. The power and data leads are included. The disc drives, made by NEC or Mitsubishi, are Beeb-powered.

With the disc drive, Solidisk provide five volumes of useful software, each on a separate diskette and with appropriate user manuals.

The CPU and Keyboard

Case

This compact steel case is designed to hold a BBC and two Solidisk floppy disc drives. It will support even a heavy weight monitor, while providing good cooling for the power supply and concealing many connecting cables. The keyboard is housed in a separate case, connected by a 24 inch lead.



The Wordprocessing Package

The wordprocessing package comprises of 160cps printer, an 80-track double-sided disc drive, five software diskettes, Wordwise Plus ROM, one blank disc, 100 sheets of printer paper, all leads and manuals. In fact, everything you need to start wordprocessing right away. This package is for the new Master machines and the BBC B fitted with Acorn or Solidisk DFS.

The printer is a 9 needle dot-matrix, with a speed of 160cps draft and 32cps NLQ mode. It features multiple pitch settings, italics, boldface, underline, super and subscripts, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85.

The disc drive is a top quality 5¼ inch drive of either Mitsubishi or NEC manufacture.

Wordwise Plus is Computer Concepts' best selling Wordprocessing ROM combining all features of an excellent wordprocessor with the flexibility of its built-in programming language.

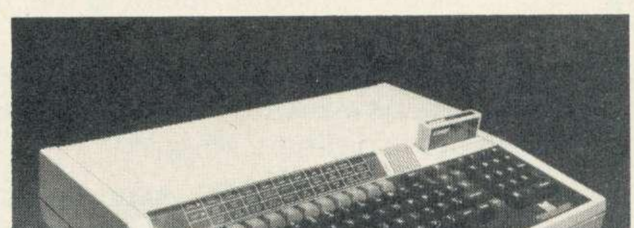
The supplemental software includes Spelling Checker, Database, Spreadsheet and games so this package is not limited just to wordprocessing.

This package can be the centre of a more substantial computer system. For instance, if there are more users, an Econet network can be cheaply built-up, sharing software, printer, disc storage and even Winchester. The cost per user will then decrease dramatically.

BBC Master
Special Package Offers Available

1) 128K BBC Master, with Wordprocessing package £750
2) Business Pack: complete 3 operating 128K Master keyboards, Econet, 160cps printer, 20MB Winchester, 1 floppy drive, Wordprocessor, database, spreadsheet, all leads and manuals. Call for demo. Ideal for small offices £2399.00

All prices include VAT, delivery extra.



Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

SOLIDISK MEMORY UPGRADES

Solidisk offers the most extensive and economical choice of memory upgrades for the BBC B on the market today. Free installation of these as with all Solidisk products is available from our 90 strong team of Local Experts.

External ROM Cartridge

Starting from the bottom of the range is a simple External ROM Cartridge Adaptor, which plugs into any ROM socket and will accept Solidisk or Acorn ROM cartridges (as used on the Electron and the new Master). These may easily be inserted or removed without opening the computer case or fear of damage to the ROMs.

Fourmeg tm CPU and ROM expansion

In the ordinary BBC computer, the processor (CPU runs at 2 Mega-Hertz. By adding faster memory and increasing the speed to 4 MHz, we have enabled the BBC to run most programs in half the time. The Fourmeg plugs into the 6502 processor socket, and the additional connections are made by sprung clips and plugs.

The board also provides four high capacity ROM sockets, as used in the BBC B Plus and the Master machine. Up to 160K of ROM software can be fitted on this board (one 64K and three 32K ROMs). The new 4MHz processor is equivalent to that used on the Master and the Acorn TURBO board. It will run most Master software such as Acorn's new BASIC4 and at twice the speed of the ordinary Master.

A switch reverts the 4MHz speed to normal.

The higher speed is available to all ROMs installed in the Fourmeg board and programs in the onboard RAM. The rest of the machine (ROM, RAM, tape, disc, timers and add-ons) is unaffected.

Fourmeg and ROM expansion with 32K RAM

The next step in expansion is the Fourmeg board with 32K of RAM. This board can be used exactly as above, with the added advantage of Shadow RAM and Sideways RAM, as on the BBC B Plus. In Shadow mode, an enormous 27K of free RAM is available, even when using MODE O and disc. In non Shadow mode, the expansion RAM can be used as two Sideways RAM banks. These can contain the image of two Sideways ROMs or be used as RAMDISK or printer buffer. As well as the four on board ROM sockets, the Shadow and Sideways RAM can run at full 4MHz speed.

32K, 64K and 128K Sideways RAMs

The most popular and well established range of Sideways RAM comprises 32K, 64K and 128K boards. You can start with 32K and upgrade later even to the 256K. The 64 and 128K RAM boards have two high capacity ROM sockets as on the B Plus.

Sideways RAMs are compatible with all issues of BBC B with most add-ons except ROM boards. Sideways RAM can run all types of software that is normally available in ROM. Solidisk has a large library of programs covering many applications. These include Wordprocessor, Database, Spreadsheet, Spelling Checker, Basic, Sprites, Ramdisc, Machine Code Monitor, Digitised Pictures, Teletext Editor, a large number of games, Disc Filing System with Page at EOO etc. and available in packs of five discs, in 40 or 80 track format.

Software pack 1 (volumes 1 to 5) is included with all Sideways RAM boards. Software pack 2 (volumes 6 to 10) and the new software pack 3 (volumes 11 to 15) may be ordered separately.



The Solidisk 256K Board

Finally, the largest in memory upgrades is the 256K board. This has 256K of RAM, four high capacity ROM sockets and a Fourmeg processor, WORDWISE PLUS ROM — the best selling wordprocessor from Computer Concepts, and the Solidisk 32K Manager ROM.

The 256K RAM can be used as Shadow RAM, Sideways RAM, RAMDISK, or all three at once.

In this board, each of eight sideways RAM banks can be 16K or 31K to increase to amount of code. Software which occupied two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation. If need be, each bank can be split between Shadow and Sideways RAM, the border being controlled by the application software.

The Manager ROM, supplied with this board, contains Solidisk Programming Toolkit, VDU recorder, printer buffer and RAMDISK.

Real Time CLock and Solidesk

The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up as in the new Master machine.

The RTC board is plugged into the Analogue to Digital Converter (ADC, NEC-7002) socket, the latter moved into an empty socket on the board.

★TIME prints the date and time, ★TIME <date><time> sets the new time. ★CONFIGURE <parm><option> sets the start-up option for one of the 20 parameters such as TUBE, Language, Filing System, Boot, Modem, screen mode etc. 20 spare bytes can be used by application software.

★DESK presents a friendly ICON/MOUSE environment. An AMX Mouse or Marconi tracker ball is preferred as input device but the keyboard may also be used. With DESK, you can display the disc catalogue, select programs, set alarm for your appointments (that is one of the things the RTC is good at!), use the calculator or write BASIC program. Available soon.

Prices, inclusive of VAT

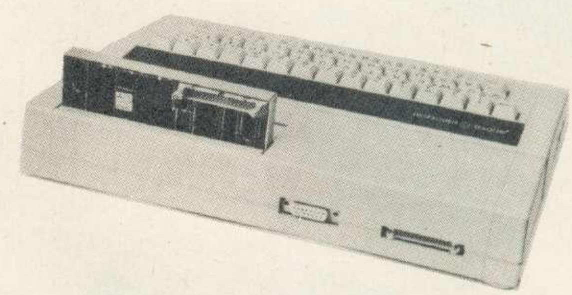
External ROM cartridge adaptor	£15.00
Basic Fourmeg board	£30.00
Fourmeg board with 32k RAM	£69.00
Sideways RAM 32k with software pack 1	£50.00
Sideways RAM 64k with software pack 1	£80.00
Sideways RAM 128k with software pack 1	£125.00
256K board with WW Plus and Manager ROM	£175.00
Real Time Clock and SOLIDESK ROM	£29.00

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

SOLIDISK EFS COMBINES DISC UPGRADE, 16K SIDEWAYS RAM

AND A WINCHESTER SOCKET FOR ONLY £59.00

On the BBC DFS side, the STL ADFS 2.1 handles both single and double density and in addition, it supports:
1) Unlimited catalogue entries.
2) Unlimited filesize.



Solidisk Double Density DFS handles both BBC Discs and Electron Discs, in single and double density whereas the Acorn's PLUS 3 can only handle ADFS discs.
Solidisk ADFS has nice features such as automatic disc format sensing, built-in disc formatter and verifier and programmable disc speed.
It also has more than 20 disc utilities built into the ROM.
Standard features for both BBC DFS and ELECTRON ADFS implementations include:
1) Automatic Write Error Correction.
2) Automatic 40/80 track stepping, the ADFS 2.1 will let you read and write 40 trak discs if you have an 80 track drive.
3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER) rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.
4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.
5) Wordprocessing facilities.
This facility allows *BOOT and other text tiles to be edited, saved and printed in any screen mode.
6) Automatic disc format sensing.
On Shift-Break, the STL ADFS 2.1 will detect the disc format and use the right BBC DFS or Electron ADFS to run.
On the Electron ADFS side, the 2.1 ROM also has some very nice features:
1) Extensive Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) are available to handle any disc drive.
2) Disc verifying facilities.
*VERIFIFY will check all disc sizes including Winchester for media defects.
3) Number of opened channels.



THE SOLIDISK 16k SIDEWAYS RAM:

Solidisk Sideways RAM is an almost indispensible add-on for the Electron with disc drives.
The Sideways RAM occupies the same memory area as the BASIC or ADFS ROM in the micro's memory map. This means that Sideways RAM can run almost any ROM type software, including languages, utilities and games.
Sideways RAM is notably invaluable to run games and specially "MEGAGAMES".
Games and programs run at 2MHz clock speed in Sideways RAM, if loaded into the Electron RAM, they can only run at 1MHz clock speed, ie half the speed of Sideways based games.
Megagames are too large to be run on the unexpanded Electron. They use extensively 8 colour high resolution screen (mode 2), background music, sound and high speed sprites.

THE WINCHESTER SOCKET:

Solidisk has the most powerful Winchester system for the BBC computers and the Electron. The Winchester system can provide from 20 Megabytes to a theoretically possible 1300 Gigabytes of storage, directly on line with the Electron.
The same Winchester unit can be used on the BBC B, the BBC PLUS and the Electron without any change.
You can read more about it in BBC Micro User or in Acorn User Magazines.

SEND TO:
SOLIDISK TECHNOLOGY LIMITED,
17 SWEYNE AVE,
SOUTHEND ON SEA,
ESSEX SS2 6JQ.

We reserve the right to change specifications and prices for improvements.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674

The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as *PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

Viewdata Host

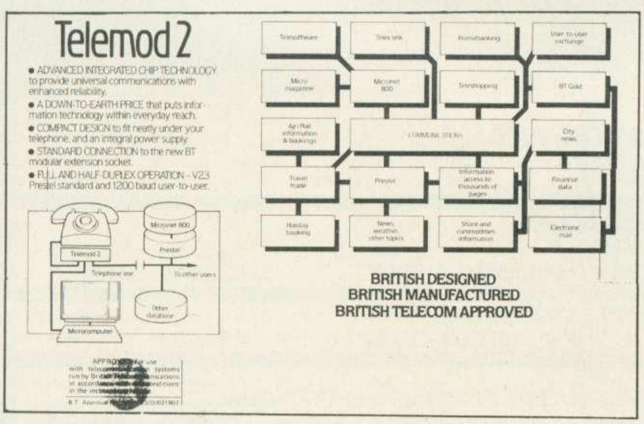
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.



Solidisk local experts

Soidisk has a nationwide network of more 90 local experts and a growing number of experts overseas. They do not usually sell our equipment but can generally fit it free of charge. Please ring Solidisk Sales office. If you wish to call at our office for a fitting however, it is necessary to make an appointment.

Telephone Southend (0702) 354674 (16 lines)

ORDER BY MAIL: Please complete the coupon opposite (or a copy) and send it to:

Prices, inclusive of VAT:

RAM/ROM expansion

Qty		Price	P&P
....	External ROM cartridge adaptor	15.00	1.00
....	Basic Fourmeg Board	30.00	1.00
....	Fourmeg Board with 32K RAM	69.00	1.00
....	Sideways RAM 32K with software pack 1	50.00	1.00
....	Sideways RAM 64K with software pack 1	80.00	1.00
....	Sideways RAM 128K with software pack 1	125.00	1.00
....	256K Board with WW+ and Manager ROM	175.00	1.00
....	Real Time Clock and SOLIDESK ROM	29.00	1.00

Disc Upgrade

....	1770 Upgrade with 2.2 DFS ROM	45.00	1.00
....	1770 + 8271 Upgrade 2.1 DFS ROM	60.00	1.00
....	ADFS + DFS ROM set	20.00	1.00
....	Upgrade from DFS to ADFS + DFS	10.00	1.00
....	Solidisk 80 track double sided drive	109.00	3.00
....	Dual Drives, CPU and Keyboard case	230.00	6.00
....	CPU and Keyboard case alone	30.00	6.00
....	EFS for the Electron	59.00	1.00

Wordprocessor Package

....	Wordprocessor for the B+ or Master	309.35	10.00
....	Wordprocessor with 1770 DFS & 2 drives	458.85	10.00

Winchesters

....	10 MB 5¼in. Beeb powered	499.00	10.00
....	10 MB 5¼in. mains powered	569.00	10.00
....	20 Mb 5¼in. Beeb powered	661.25	10.00
....	20 Mb 5¼in. mains powered	747.50	10.00
....	20 Mb 3½in. Beeb powered	720.00	10.00
....	40 Mb 3½in. mains powered	1148.85	10.00

Modems

....	Linemaster ROM and manual	10.00	1.00
....	Telemod 1 MODEM (BABT approved) with Linemaster ROM	50.00	3.00
....	Other MODEMS	P.O.A.	—

Datalife Diskettes

....	MD525 (SS/DD) box of 10	16.00	1.00
....	MD557 (DS/QD) box of 10	25.00	1.00

EPROMS

....	2764-25 25pcs. (to clear)	25.00	1.00
....	27128-25 (or better) pack of 5	25.00	1.00
....	27256-25 (or better) pack of 3	25.00	1.00
....	UVIPROM Eprom Programmer	19.00	1.00
....	UVIPROM32 for our 27256's	21.00	1.00
....	UVIPAC Eprom eraser	20.00	1.00
....	Solidisk Toolkit ROM	10.00	1.00

Total ....

Name: ....

Address: ....

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VISA

ACCESS

We reserve the right to change prices and specifications without notice. If you wish to call at our office, please telephone for an appointment.

Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

BBC MASTER SERIES



AMB15	BBC MASTER Foundation computer 128K	£435 (a)
AMB12	BBC MASTER ET 128K (only ANFS)	£348 (a)
AMC06	Turbo (65C102) Expansion Module	£87 (b)
ADF13	Rom Cartridge	£13 (d)
ADF10	Econet Module	£49 (c)
ADJ22	Ref. Manual Part I	£14.50 (c)
ADJ23	Ref. Manual Part II	£14.50 (c)
ADJ24	Advanced Ref. Manual	£19.50 (c)

BBC PLUS COMPUTER RANGE

BBC B PLUS with 128K..........£389 (a)
BBC B PLUS Econet & DFS..........£409 (a)
BBC Dust Cover..........£4.50 (d)

UPGRADE KITS

1.2 OS ROM..........£7.50 (d) Econet Kit..........£55 (d)
DNFS ROM..........£17.50 (d)

1770 DFS Upgrade for Model B..........£43.50 (d)
ADFS ROM (for B with 1770 DFS & B plus)..........£26 (d)
64K Upgrade Kit for B plus £35 (d)

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)		
Econet Socket Set	£34 (c)	Printer Server Rom	£41 (d)
File Server Level I	£75 (d)	10 Station Lead set	£26 (c)
File Server Level II	£210 (d)	Adv. Econet User Guide	£10 (d)

ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1375 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard.

10 Mbyte Winchester £1350 (a)
30 Mbyte Winchester Drive £1999 (a)

TECHNOLINE

PHONE TECHNOLINE 01-450 9764 FOR DETAILED SPECS ON THE MASTER SERIES & UPGRADES

TECHNOLINE offers you 24 hour, 7 days a week ordering/information
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Technical Information:
1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.
Now available for use.
01-452 1500
(Week days 7pm-9am, 24 hours Weekends)

EPROMs/RAMS

2764-25......£2.00 (d) 27128-25......£2.75 (d)
6264LP-15.........£3.75 (d)

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. £169 (b)

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5 of this advertisement. £299 (b)

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £199 (a)

ZDP240: ZEP100 with TORCH twin 400K Disc drive £429 (a)

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

BITSTICK I £349 (a)

ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. £775 (a)

Upgrade for Bitstick I to II £415 (b)

Bitstick Multiplotter Driver (most popular plotters included) £79 (b)

Epson FX80 Screen dump routine for Bitstick I £35 (d)

Epson FX80 dump for Bitstick II £39 (d)

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

MAIL ORDER
17 Burnley Road
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RETAIL SHOPS
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
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(near Edgware Road ⊖)

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Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

EPSON PRINTERS

EPSON LX-80 NLQ: A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed as standard 100cps.

LX-80 **£195 (a)** Optional Tractor Feed **£20 (c)**

EPSON FX Range: This new range designed to meet virtually every type of computer based printing requirement, from correspondence quality (NLQ) text printing, a variety of fonts, to seven different levels of graphic printing. Fully IBM PC compatible with full graphics character set from the PC's keyboard. 8K built in buffer allows either data storage or creation of upto 240 characters of your own design. 160 cps for draft print and 32 cps for NLQ.

FX85 (80 col)..........**£315 (a)** FX105 (136 col)........**£449 (a)**

EPSON JX80 4 colour printer..................................**£435 (a)**

EPSON LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 (80 col) **£595 (a)** LQ1500 (136 col) 2K buffer **£875 (a)**
32K buffer **£950 (a)**

TAXAN KAGA PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col).........**£195 (a)** KP910 (156 col)........**£339 (a)**

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£295 (a)**

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 **£289 (a)**

Centronics GLP (NLQ) Printer **£109 (b)**

DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro.

DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but like all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for use in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

The 12 cpi pitch is **not available** even on most "NLQ" printers. The rom comes complete with manual for only **£28 (d)**

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.



Detailed leaflet on request.

Epson Hi-80 Plotter £345 (a)

HITACHI 672 PLOTTER

Up to A3 on OHP film or paper with 4 colours. Its low inertia plotting system, which moves both the paper as well as the pens, gives high acceleration, and therefore high throughput, from a compact economical mechanism. Features both HP graphics language. Both parallel and RS232 interfaces as standard. Step size 0.1mm. **Hitachi 672 Plotter £465 (a)**

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer **£75 (d)**

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£199 (a)**

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69 (c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea.)	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 **£19.50 (c)**

PRINTER ACCESSORIES

EPSON ACCESSORIES:
Interfaces:
8143 RS232.....................£28 (d)
8148 + RS232 + 8K............£75 (d)
8165 IEEE + Cable..........£65 (d)
8148 RS232 + 2K............£57 (d)
8132 Apple II..................£60 (d)
8177P NLQ for FX80+/FX100+ ....£99 (d)
8190S NLQ for FX80+/FX100+ ....£64 (d)
Parallel & Serial Buffers of various size also available.
FX80/80+/85 Tractor Attachment.......................£37 (c)
FX80/80+ Paper Roll Holder.............................£17 (c)
LX80 Tractor Feed..£20 (c)

SHEET FEEDERS:
8338 LX80...................... £49 (b)
8333 FX100+/105...........£169 (a)
8331 FX80+/85..............£99 (b)
8330 RX80+ ....£129 (b)

Ribbons:
RX/FX80/80+, FX85........£5 (d)
LX80.........................£4.50 (d)
RX/FX100/100+, FX105... £10 (d)
HI80 Pen Set (Aqueous/Ball point)........................£7.50 (d)

Dust Covers:
FX80........................£5.50 (d)
TAXAN/Canon KP810........£6 (d)
FX100.........................£7.50 (d)
KP910...........................£7 (d)

TAXAN KAGA/CANON Accessories:
RS232 +2K buffer...........£78 (d)
Ribbon...............................£6 (d)

JUKI 6100
RS232 Interface...............£65 (d)
Tractor Feed..................£129 (a)
Ribbon (Carbon)............£2.00 (d)
Spare Daisy Wheel.............£14 (d)
Sheet Feeder...................£182 (a)

BROTHER HR15
Daisy Wheel....................£18 (d)
Tractor Feed....................£90 (a)
Ribbon (Carbon/Nylon)...£3.00 (d)
Sheet Feeder..................£182 (d)
Keyboard.......................£135 (a)
Red Correction Ribbon....£2.50 (d)

Printer Leads:
BBC Parallel Lead (1.2m).....£6 (d)
BBC Serial Lead (1.2m).........£6 (d)
Other lengths can be supplied on order.
IBM Parallel Lead (2m)..........................£12 (d)

PAPER & LABELS
Plain Fanfold paper with micro perforations:
2000 sheets 9½" × 11"..............................£13 (b)
2000 sheets 14½" × 11".......................£18.50 (£4.50)

Labels/1000:
Single Row 3½" × 1 7/16" £5.25 (d)
Triple Row 2 7/16" × 1 7/16" £5 (d)

DISC DRIVES



Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

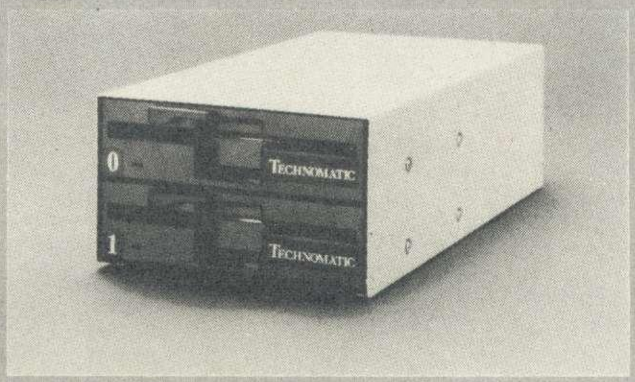
The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2×400K/2×640K 40/80T DS **£279 (a)**

PD800



TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£249 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

TS400 £109 (b) **PS400** with psu **£129 (b)**

SPECIAL OFFER

ACORN's Single Drive 1 × 100K/1 × 160K 40T SS £49 (b)

TS35



3.5" DRIVES

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

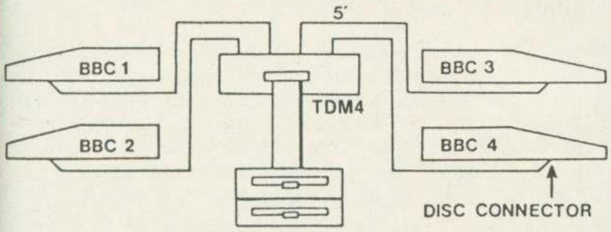
1 × 400K/1 × 640K 80T DS : TS35 1 **£109 (b);** PS35 1 with psu **£129 (b)**

2 × 400K/1 × 640K 80T DS : TD35 2 **£199 (b);** PD35 2 with psu **£209 (b)**

All drives listed above are fully compatible with single and double density DFSs. The larger capacity referred to above is for the Acorn's ADFS system.

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) **£135 (a)**
TDM2 Dual Unit (2 computers) **£75 (b)**

DISC STORAGE BOXES

10 5¼" Disc Library Case **£1.80 (d)**
30 5¼" Disc Lockable Box **£15 (c)**
40 5¼" Lockable Box **£9.50 (c)**
100 5¼" Disc Locable Box **£15 (c)**
10 3½" Disc Case **£3 (d)**

3M 5¼" FLOPPY DISCS

40 T SS DD £12 (d) 40 T DS DD £16 (d)
80 T SS DD £21 (d) 80 T DS DD £22 (d)
£1 extra pack for library case packing

3M 3½" FLOPPY DISCS

80 T SS DD £30 (d) 80 T DS DD £38 (d)
Discs in packs of ten

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. **£14.50 (d)**
Floppiclene with 20 disposable cleaning kits. £16.00 (d)

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

MAIL ORDER
17 Burnley Road
London NW10 1ED

RETAIL SHOPS
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

TECHNOLINE
24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COLOUR MONITORS

RGB MONITORS *(all monitors supplied with a BBC lead)*

1431 14″ RGB Std Res	452 × 585 pixels	**£179 (a)**
1451 14″ RGB Med Res	653 × 585 pixels	**£235 (a)**
1441 14″ RGB Hi Res	895 × 585 pixels	**£375 (a)**

MICROVITEC 14″ RGB/PAL/Audio

1431AP 14″ Std Res	452 × 585 pixels	**£205 (a)**
1451AP 14″ Std Res	653 × 585 pixels	**£275 (a)**

The above monitors are available in plastic or metal case.

MICROVITEC 20″ RGB/PAL/Audio
2030CS 20″ Std Res **£380 (a)** **2040CS** 20″ Hi Res **£685 (a)**

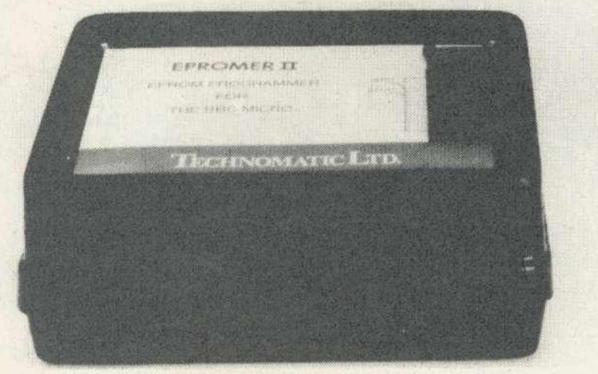
TAXAN KAGA 12″ RGB:
Super Vision III + with amber/green option **£345 (a)**

MITSUBISHI XC1404 14″ Med Res RGB:
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. **£249 (a)**

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.
Touchtec 501 **£260 (b)**

EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc **£99 (b)**
ROM based software **£10**

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**
UV1B as above but without the timer. **£47 (b)**

MONOCHROME MONITORS

KAGA
KX1201G 12″ HI-RES green etched screen **£99 (a)**
KX1203A 12″ HI-RES amber etched screen **£105 (a)**

SANYO
DM8112CX 12″ HI-RES green screen **£95 (a)**

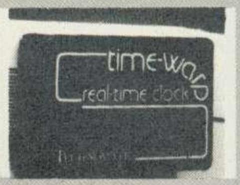
PHILIPS
BM7502 12″ HI-RES green screen **£75 (a)**
BM7522 12″ HI-RES amber screen **£79 (a)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors) **£20 (c)**
Kaga Swivel Base for mono monitors with integral clock **£22 (c)**
Philips Swivel Base **£14 (c)** Monitor Plinth **£13.50 (c)**
Double Tier Plinth for flat drive, computer and monitor **£19.50 (c)**
Kaga RGB Cable **£5 (d)** Microvitec RGB Cable **£3.50 (d)**
Monochrome BNC/PHONO Cable **£3.50 (d)**

REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£29 (c)**



ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

AIRES B32 RAM BOARD **£79 (d)**
ARIES B12 ROM BOARD **£40 (d)**
ARIES B12C Adaptor Board for B12 **£7.50 (d)**

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£37 (d)** Battery Backup Kit **£18 (d).**

ATPL Board for BBC PLUS 10 × 16K ROMs **£29 (d)**
COMPUTER VILLAGE CV-16 Rom Board **£38 (d)**

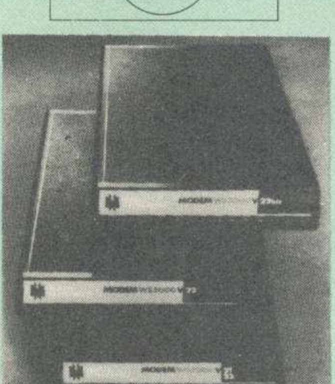
RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£79 (b)**

(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.



WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**

WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

BBC Data Cable for WS3000 £6 (d) Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £125 (c)** Data Cable **£7.**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4 (d)**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SKI KIT (Allowing total control of the modem by your computer) **£10 (d)**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£86 (b)**

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

COMMUNICATIONS SOFTWARE

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc **£16.50 (d)**

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**

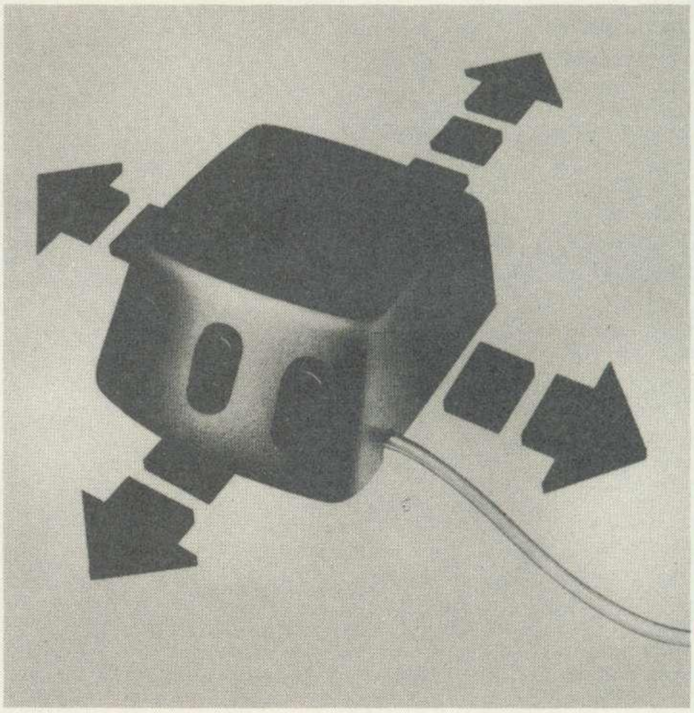
RS232 Solution (Book) **£15.95 (c)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

RS232 Solution Book **£15.95 (c)**

AMX MOUSE with SUPERART

The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.



AMX Mouse with Super Art **£67 (d)**

AMX Super Art Package on its own **£43 (d)**

AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. **£47 (d)**

AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**

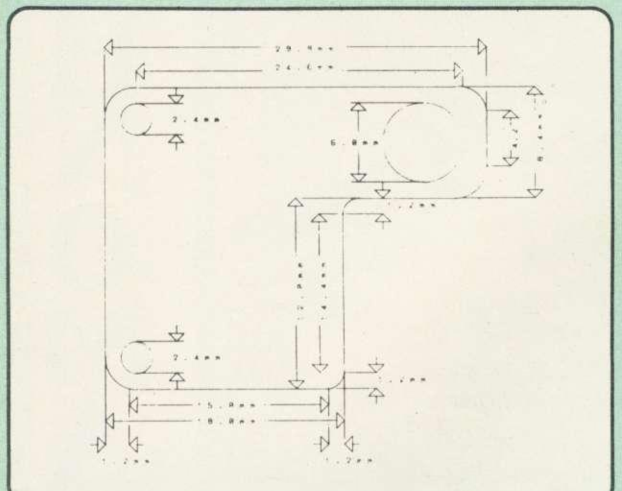
AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

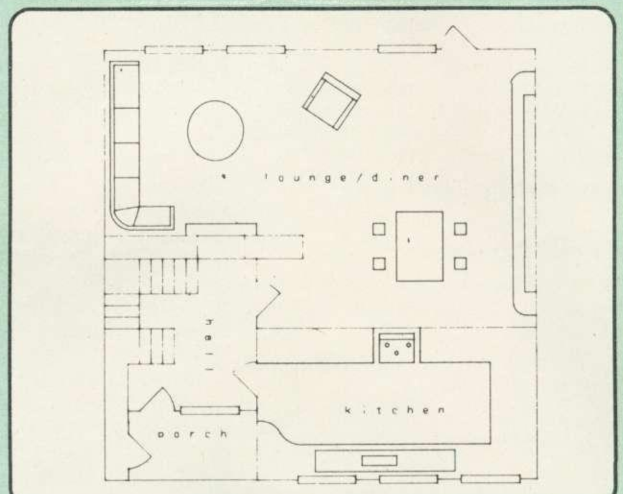
RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-21 (with 'icon artmaster'). **£59 (c)**

NOVACAD
Computer Aided Draughting for the BBC Micro





A sophisticated CAD package with unique facilities which until were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive then NOVACAD's capabilities are further enhanced.

- Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
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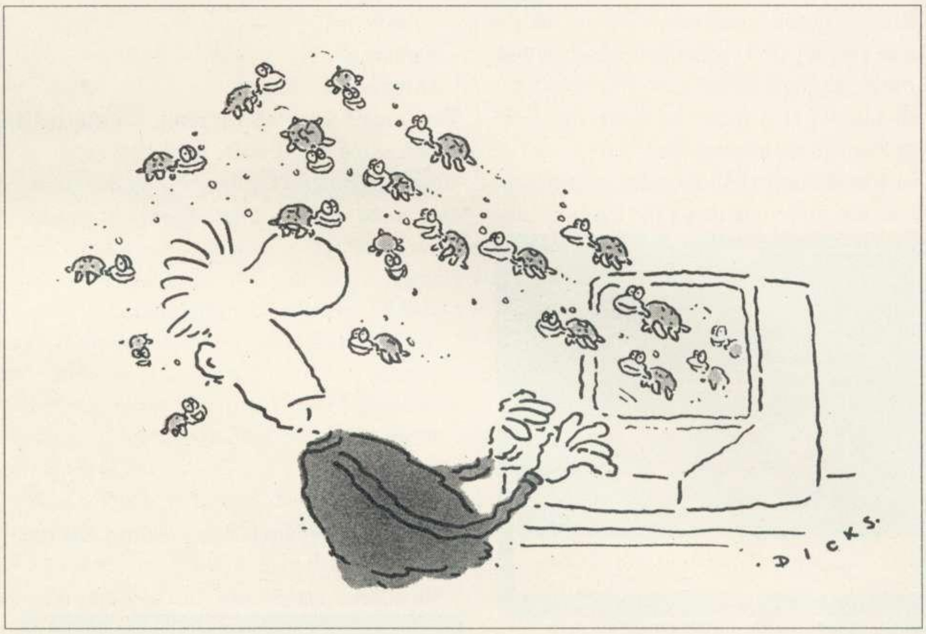
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HINTS & TIPS

An unexpected version of turtle graphics and an explanation of spooled files are among this month's offerings from Martin Phillips

FOOLING AROUND WITH TURTLES



April has come round again so here's another chance to use the computer as an April Fool on your friends.

The computer can be exploited as an excellent medium for such practical jokes – most people are used to the odd bug in a program, but what about a program that is designed not to work correctly? This is the idea behind this year's April Fool.

A version of turtle graphics, which is part of the Logo language, has been doctored so that it will not work as expected (see listing 1 in the yellow pages).

Our program can be demonstrated perfectly, but at the discreet press of a key it can be made to misbehave. The fact that the poor victim has seen it demonstrated correctly leads them to believe that it is they who have made the mistakes, and not the program. Nothing so drastic will go wrong to make anyone instantly suspicious, indeed nothing will go wrong with the program at all to start with. Also, the problems are random so that something going wrong once will not necessarily go wrong thereafter.

To switch the program from working correctly to going wrong, all you need do is press the Return key on its own. Even with someone watching, it is easy to give an extra press of this key as you quietly say, 'Now you have a go!'

The program will normally start off in the mode that will misbehave so, before demonstrating, it is necessary to press the Return key first. Again this almost certainly will go unnoticed by your friends.

My apologies and thanks go to Malcolm Banthorpe who provided the original version of this Turtle Graphics program (published in February 1985's *Acorn User*) – I trust he is not too upset at the result!

Malcolm's program was well structured and the procedures easy to follow, so it was quite a simple task to find out how the program worked and then adapt it. The only real problem was memory so one or two features were removed, and some of the procedure names were shortened, but basically the program remains the same, and is only 230 bytes longer.

ILLUSTRATION BY IAN DICKS

The program needs to work correctly for a short time to allow the victim to build up some confidence with it, so the first thing that was done was to put a counter in the program so that some kind of record could be kept of the number of moves made (all the effects are dependent on this).

There was a ready made procedure for this, PROCupdate (shortened to PROCup in this version), which repositioned the pointer and updated the X and Y co-ordinates and the angle, printed in the corner of the screen. These latter features have been deleted to save memory. PROCup checks to see if the error feature has not been switched off (the variable 'wally'), and if it hasn't, a counter Z% is incremented. To further confuse everything, once Z% gets above 25, the point where things start going wrong, there is a two-thirds chance that Z% will be reduced down to a 'safe' value of 20.

A new function, FNwally, has been added which will add or subtract a small amount to some of the parameters input.

This amount can be very small, and go almost unnoticed when it occurs, but when more moves are made, these errors tend to become exaggerated – this is at its most noticeable if a couple of procedures are used over and over again.

If Z% is less than 25 then the function returns a zero, so making no change to any of the routines.

The error routines can be switched on and off by pressing the Return key instead of entering a command (the program can be made to behave normally by pressing the Return key, and made to misbehave by again pressing the key).

This is useful for demonstrating the program, and for when you get tired of fooling people. The Clear function will reset the counter if it is above 25.

There are one or two special effects included. The turtle icon provided by Malcolm Banthorpe has been used (or abused?) to make an amusing screen: if the counter Z% is above 25 then the screen is filled with multicoloured turtles (this will happen only infrequently). It can subsequently be cleared by using the Clear statement again.

Another effect has been included (in the routine that draws the pointer) so that a turtle will randomly appear at the pointer position, walk off the screen, and the program will then continue as normal.

The colour routines are also altered so that a different colour will be obtained if the counter is above 25. Even quitting has been made a little more difficult!

For those who do not have a copy of February 1985's *Acorn User*, here are a list of the commands, together with the minimum abbreviations, which can be entered in upper or lower case. It is essential, though, that spaces are inserted between the commands and their parameters.

Clear (C.) clears the graphics part of the

screen, and homes the cursor into the middle of the screen. It also positions the turtle angle to zero and sets the scale to unity.

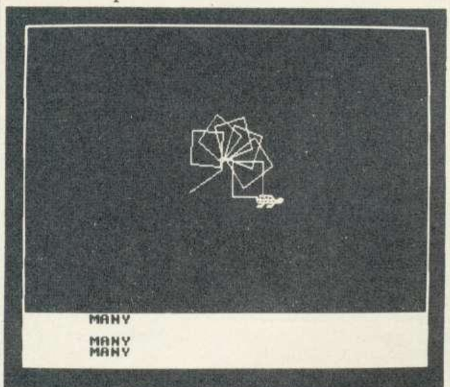
Penup (P.) allows the turtle to be moved without drawing a line.

Pendown (Pend.) allows the turtle to draw. This is the normal condition.

Right [angle] (R.) turns the turtle clockwise through the angle given.

Left [angle] (L.) turns the turtle anticlockwise through the angle given.

List [procedure] (LI.) lists the definition of the named procedure down the left-hand side



A turtle appears at the pointer position . . .

of the screen.

Load [filename] (LO.) loads a set of definitions.

Forget [filename] (FORG.) allows a previously procedure to be removed. To edit a procedure, first list it then Forget it, and then redefine it.

Forward [distance] (F.) moves the turtle the specified distance forward.

Move [x co-ordinate] [y co-ordinate] (M.) moves the turtle to an absolute screen position without drawing. The screen co-ordinates are in the range −640 to 640 in the horizontal plane, and −432 to 432 in the vertical plane, both in steps of four.

Pencolour [colour number] (PENC.) selects the current drawing colour, which can be in the range 0 to 3.0 is the background colour so will not normally be seen. Unless redefined using Setcolour, colour 1 is red, colour 2 is blue and colour 3 is white.

Quit (Q.) ends the program.

Setcolour [colour number] [actual colour] (SET.) defines the four possible screen colours. For example, Setcolour 0 Blue will set the background colour to blue. The colours available are black, red, green, yellow, blue, magenta, cyan, white. The colour names cannot be abbreviated.

Thinlines (TH.) causes lines of one pixel width to be drawn, the default condition.

Fatlines [line width] (FA.) is a non-standard Logo function, but one that is great fun. It allows the thickness of a line to be set.

Outline [colour number] (O.) is a simple way of giving Fatlines an outline in a different colour. It can be disabled with Outline 0 or Outline Off. The following example gives an idea of its use:

```
Pencolour 1
Fatlines 6
Outline 3
```

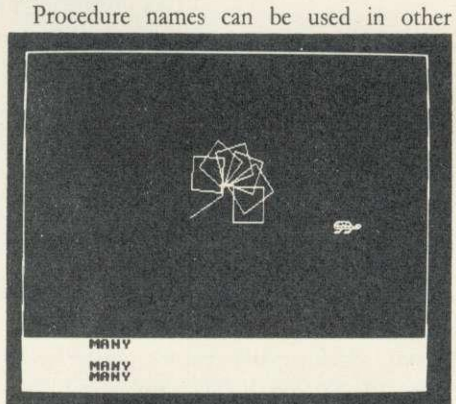
This causes lines of six pixels width to be drawn in red with a white border.

To [procedure] (T.) allows a named procedure to be defined. The sequence of instructions must finish with the word End. For example, produce a procedure called SQUARE (which will draw a square):

```
To SQUARE
Repeat 4
Forward 150
Right 90
Again
End
```

While the procedure is being defined, the text appears in red.

Procedure names can be used in other



. . . gets bored and wanders off

procedures so, for example, to use the procedure SQUARE in the new procedure PATTERN:

```
To PATTERN
Repeat 8
SQUARE
Right 45
Again
End
```

Repeat [number] (RE.) is used within a definition and causes the sequence of actions to be repeated the specified number of times. Examples of its use are given above. It is terminated with Again.

Save [filename] (SA.) saves all the defined procedures to tape or disc.

Scale [number or fraction] (SC.) allows the size of a defined shape or of lines within a repeat loop to be changed. Scale is set to unity.

The value given in Scale is multiplied by the previous Scale factor.

Setscale [number or fraction] (SETS.) sets an absolute scale.

All the changes made can be switched on and off as described above. Because no errors can be seen until at least 25 moves have been made, the program appears to function correctly for quite some time.

Most of the changes are quite subtle. Changing left to right, or forward to backwards, for example, would soon be spotted, and are not as effective as very small changes. The following commands are effected:

Clear Sometimes this will fill the screen with turtles instead of clearing the screen. Using Clear again will clear the screen.

Right The angle here can be changed by one or two degrees, sufficient to make most patterns look awful!

Left As above.

Forward The length may vary by a few units (larger or smaller).

Move The co-ordinates may be altered from those specified.

Pencolour A random choice of the colours available may be made.

Quit It works sometimes.

Setcolour The program may decide which colour (including the flashing ones) to use.

Outline Again the computer may choose.

The program is quite straightforward and easy to enter.

Line 2420 should be altered until the program runs correctly, so that instead of the whole ON ERROR line it reads:

```
ON ERROR END
```

This will allow the use of Escape to stop the program and change it, and any errors will stop the program.

If using a machine with PAGE set to greater than &1300, (test with PRINT ~PAGE) then do save the program before running it, otherwise pressing Break will give the 'Bad program' message, and all the work of typing it in will be lost.

£10

PRINT FOR A DOT MATRIX

In last December's Hints & Tips I threw out a challenge for readers to produce a routine to convert and print one of the BBC micro's user defined characters so that it would print correctly on a dot matrix printer. It seems a simple task, but turns out to be really quite complicated.

What is required first is a routine that will rotate and reverse each line of the character definition through 90 degrees to suit the way the printer needs to be programmed. Then

there needs to be a routine to intercept the printer output stream and if a character greater than 127 is found, print out the VDU definition instead.

Trying to achieve this from *Wordwise Plus* poses particular problems because it filters out all characters greater than 127. This can be overcome by using the segments, but it is not very satisfactory.

What would be even better is a routine that would first check which characters had been defined, then change those characters, and perhaps use *FX5,3 to intercept the printer output stream and print user-defined characters automatically.

So far I have received one attempt at this routine, but it did not work satisfactorily. My thanks, though, go to those readers who submitted their software.

A couple of readers sent in simpler procedures to manipulate the bit pattern and make it suitable for a dot-matrix printer.

Mr J Walsh from Bolton provided the neatest solution here, with Mrs M Clayton from Leighton Buzzard providing a close second. Again my thanks go to both readers, and Mr Walsh wins himself £10 – his program is given in listing 2 on the yellow pages.

First a heart, spade, club and diamond are defined. Then there is a short machine code program. The eight-byte data block of the user-defined character is loaded into locations starting at location &71. Lines 420 to 630 rearrange the data and store it in a new block from &79 to &8A. Lines 640 to 880 send the bit-image code to the printer followed by eight bytes of data. This routine will send any character to the printer, not just those user-defined characters.

Mr Walsh also provided a version to give double density print – the following changes need to be made for this. Amend lines 700 and 740 to read:

```
700 LDA#76
740 LDA#8
```

and add the following two new lines:

```
835 LDA#1: JSR#oswrch
836 LDA&79, X: JSR#oswrch
```

Mr F L Menting from Amsterdam sent in a program which prints characters in the range 0-127 normally, and produces a bit-image for those characters above 127. His program is shown in listing 3.

The string to be printed is put into the string '$string' (lines 120 to 180) which can be up to 255 characters long, and can be any mixture of normal and user defined characters. After the string has been defined the machine code routine 'print' is called.

When a character above ASCII value 127 is found, the program jumps to a routine 'print_user_def' which first prints the character on the screen, manipulates the bit pattern and then sends it to the printer. This program has a more elegant way of sending bytes to the printer than listing 2 (see subroutine 'send' at line 1230).

It's also possible to alter it to print in emphasised mode if the program is altered in a similar way to listing 2.

TO SPOOL OR NOT TO SPOOL

A question that causes much confusion is 'what is the difference between an ordinary file and a SPOOLed file?'.

The disc sector editor presented last month allows us to look at the difference between the two types of file.

Take a blank formatted disc and save the disc sector editor on it. Also SPOOL a version of it to disc. Remember to give the SPOOLed version a different filename so it does not overwrite the ordinary version.

For those who are hazy about producing a SPOOLed file, follow these instructions. Type *SPOOL EDITOR. There should be some reaction from the disc drive, but little else. Then type LIST and the program will list and be written to disc. Typing *SPOOL will then close the spool file.

When the normal version of the program is viewed sector by sector, there are no line numbers to be seen and the various Basic statements can't be found in the ASCII part of the screen display.

This is because the Basic statements are all stored in a coded form. For instance, the code for a REM statement is &F4 (&F4 is the 'token' for REM). In fact the fifth number stored in the sector is the value &F4, the token for REM.

A SPOOLed version of program is stored in quite a different way.

Here the program has been written to disc character by character. REM is saved as R, E and M (instead of &F4), and all the line numbers are stored digit by digit. Thus line 10 is stored as &31 followed by &30 (&31 is the ASCII code for 1 and &30 the ASCII code for 0). With the normal program listing, this line number is stored as &A (=10).

There is, however, a penalty to pay for the SPOOLed version, and that is one of space – it takes up quite a bit more space than the normal version does.

For the three Hints and Tips listings, see yellow pages 105 to 109

QUICKFIRE QUESTIONS

When altering a listing or correcting it, don't press Break and then use OLD or O, as it's all too easy to press 0LD or 0 and lose the program. If you have to get out of the program using Break, first program the Break key thus:

*KEY10 OLD|M

You can include extra things in this definition; for instance, getting it to list straight away.

Do not use VDU21 to switch the screen off and VDU6 to switch it back on again, as it sends odd bytes to the printer. This can cause the program to hang up if enough are sent. Instead use *FX3,n. *FX3,10 will send to the printer but not the screen (and does not require the use of VDU2 and VDU3), and *FX3,6 or *FX3,14 will switch the screen and the printer off. All three can be restored by using *FX3.

Fed up with the sound in a program? Use *FX210,1 to turn it off before loading. Pressing Break cancels it, so if loading from disc don't Shift-Break but type *EXEC !BOOT or *RUN !BOOT depending on whether the boot file is in Basic or machine code.

Even on the Beeb, programs can be speeded up by typing *FX16,0 if the analogue port is not being used.

In December's Hints & Tips I showed a way of preparing a !BOOT file to load *View*, and select the right coloured screens. Thanks go to all those readers who write in to point out that the colours could be changed by pressing CTRL-S. However, the reader concerned wanted to avoid this task every time he loaded *View*, hence the use of the disc boot file.

M Bowles from Retford needs a fill routine to work with any shape. Several have been published in *Acorn User*. A graphics cassette containing such a routine is available from *Acorn User* – see the advertisement on page 101 in this issue.

Mr G A Smith from Worcester Park has a BBC micro with an issue 3 circuit board and is wondering what modifications are needed to the board for him to run Computer Concepts' speech system. The answer is none (although the Acorn speech system will not work correctly on an issue 3 board). The Computer Concepts system relies on the Acorn speech processor, but is able to detect the incorrect circuit and compensate for the problem itself.

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FIRST BYTE

ERROR MASSAGE

No matter how often you check a listing, mistakes are easy to overlook. Here we present a program to make the debugging process less painful

Tessie Revivis

Entering program listings can be damaging to your health. That statement should be carried on every micro ever made: in fact I think I'll see my MP and persuade her to put the thought to her cabinet! Seriously though, getting a program to run as it should is not always straightforward. If it's a listing from a book or magazine then with luck the accompanying article will contain some hints on how to find out what's wrong with it – an exercise known as debugging or getting rid of the bugs.

If it's your own work you'll have a better idea of what's happening and where, and this should make it easier to debug. But it's never as simple as that – program blindness sets in and the mistake that you've made is overlooked time after time, no matter how often you examine your listing.

The trouble doesn't stop there. Your bug might be fatal: as soon as you run the program the message 'Bad program' appears – and of course you hadn't saved the listing before running it.

Programmer's Aid

Listing 1 on the yellow pages, *Programmer's Aid*, contains rather a lengthy program for First Byte, but it's worth its weight in gold for the problems it solves. It provides three main routines which will print out the actual error in the program as well as the normal error message; allows you to list the variables in a program in case you come across a 'no such variable error'; and recover a 'Bad program' to a listable form.

It also provides an incrementing save routine so your current program will be saved under an automatically incrementing filename. All these functions are readily available simply by pressing a red function key.

Obviously you need to take special care entering this program. You should save the program before running it and save it again after making any alterations, so that you always have an up-to-date copy of it in case anything awful happens.

As with all program listings in *Acorn User* (and indeed other magazines and books), read the associated articles and any 'how to enter' notes all the way through before you even attempt to start typing.

Initially, don't enter program lines 90 to 210 – these will be entered and explained later on.

Three procedures are included in listing 1 which assemble sections of machine code. Entering machine code is as easy as typing in a Basic program – it's simply a succession of keystrokes so don't be put off if you can't understand what it's doing. If you get an error when you run the program, check that your line is identical to the published one. The program includes a checksum routine which only lets you continue when the machine code sections are correct.

The function key actions are defined in lines 330 to 430. Take care to double check the *KEY6 definition in line 390 as it's quite long.

Once the program runs without any errors save it under the filename AID.

When the program has been entered and run you can do away with the program itself, ie, type NEW, so you can now enter your own programs. The important working parts of the program (the machine code and function keys) will remain in memory until you either turn the micro off or press the CTRL and Break keys together, resetting the system.

The next step is to test it, which you can do by working through a few examples: they also show how to track down errors. First cut out, copy or overlay the function key strip shown in figure 1 (on yellow page 110).

Press CTRL-Break together to reset your micro, type OLD and then run the program.

I'll look at a fairly common error first, 'Mistake'. The computer returns this whenever it comes across something it doesn't recognise. For example, if you add the following line to your program and then run it you will get a 'Mistake at line 1' error.

```
1 PRONT "Wot Mistake!"
```

Here we meant to type PRINT but pressed the O key (next to the I on the keyboard) and got PRONT instead. This should be fairly easy to spot as it is right at the beginning of the program – it wouldn't be so easy if it was in the middle of a long program.

Now press function key f0: the 'Error extension on!' message should be printed. Now run the program. This time not only will you see an error message but above it the offending line will also be printed:

```
PRONT "Wot Mistake!"
Mistake at line 1
```

If the line is a multi-statement one, it will be printed only up to the next command. For example, if you change line 1 to:

```
1 PRONT "Wot Mistake!" VDU 7
```

you would get the same error message as above. Now press f1 which switches the error extension routine off. The message 'Error extension off!' should be displayed.

There are other errors associated with leaving a special character out. Try editing line 1 so it reads:

```
1 PRINT "Wot Mistake!
```

Note that the closing quotation marks have been missed out. If you run the program now you will get the message 'Missing" at line 1'. Enable the extended error message routine by pressing f0 and run the program again. This time the extension will print '"Wot Mistake! Missing " at line 1'. The extended message has been kept to a minimum: note that the PRINT command has been left out. This should make it easier for you to track down just where the missing " should go.

Variable errors

Another common error is 'No such variable' and it can be quite infuriating. It generally occurs because you have mis-typed a variable name. Enter the following three lines:

```
1 variable% = 10
2 PRINT varoable%
3 END
```

Here 'variable%' in line 2 has been mis-typed. Press f2 and run the program. The error message reported is:

```
veroable%
No such variable at line 2
```

Here the unrecognised variable is printed out, telling us what's causing the problem.

All we need now is a list of the variables in the program. Pressing function key f3, will list these on to the screen. There is only one in this case, variable%, so the 'offender' can be

located immediately but, of course, this technique can be used in long programs containing many variables. First note the variable causing the problem, and then list all those present in the program. If the list is very long the computer will stop listing them when the screen is full; to continue the listing press the Shift key.

Occasionally it is possible to be fooled into thinking that an error lies in a particular line when in fact it is somewhere else entirely. Enter the following:

```
1 PROCtest (23,33)
2 END
3 DEF PROCtest (A%)
4 PRINT A%
5 ENDPROC
```

With the extension on (f0), run the program. You should see:

```
test (23,33)
Arguments at line 1
```

When you look at line 1 you see it's exactly as it should be. You check, double check, triple check . . . and still the phantom error occurs. In fact the problem lies in line 3.

We are trying to pass two numbers into the procedure called PROCtest, but have only provided one variable into which to pass them. Basic expects two, so line 3 should really read:

```
3 DEF PROCtest (A%,B%)
```

The moral here is that if the error is concerned with a procedure you must also check the procedural definition. The reverse can also be true – if an error occurs within a procedure it could be that the error lies where the procedure was called: look out for these hidden errors!

Function key f3 contains a machine code program which will recover a 'Bad Program'. To test this bad program recovery routine, first make sure that you have saved the program. Then press f3. Of course your program isn't bad, yet, and you should be able to list the program again. If, however, you get a bad program error type NEW, load the listing back in and check it – there's an incorrect statement (but not a bug as such) somewhere, most likely within DEF PROCprogram. If the test works, enter:

```
?(PAGE+3)=255
```

Now type LIST, which should give you a bad program error. Press f3 and, all being well, the program should be restored to its original form. Occasionally the recovery routine will not be able to restore your program exactly. If this happens, the routine will put an '@' character in the suspect places. You can then edit these out and hopefully restore your program to its original form. Of course, if your bad program occurred after running it, it could contain a fatal error, so save it and run it again. If the bad program error occurs again, look very closely at your listing. It may be that you are writing information over the listing in some way, as in ?(PAGE+3)=255 above, or perhaps changing the value of PAGE.

Not all bugs are caused by typing or omissions – some are logical errors. By this I mean that the program works fine but doesn't function as expected. For example, enter the following short program.

```
1 FOR N%=1 TO 10
2 REM
3 REM
4 NEXT N%
5 END
```

Before you run it type:

```
TRACE ON
```

Now run the program. You will see some numbers, in the range 1 to 5, each printed within square brackets. These numbers refer to the program lines. What TRACE ON does is to print out any line number whenever it is encountered . . . during the running of the program. Now change line 2 of this program:

```
2 N%=1
```

Type TRACE ON again and re-run the program. Now the line numbers continue forever (or until you press Escape). The reason is that N% will never reach 10 (the value at which the FOR . . . NEXT loop will end) as it's always reset to one by line 2.

By using the TRACE ON facility of Basic you can see that the error is within lines 2, 3, and 4 and can therefore restrict the area you need to search. (Note that a Basic statement within a program may be executed without the number of the line in which the statement lives being encountered. In the example program above, line 2 is executed although the number 2 does not appear in the trace.) *Programmer's Aid* defines function keys f4 and f5 to hold the commands TRACE ON and TRACE OFF respectively.

Let's go back to the missing program lines I told you not to type in yet, lines 90 to 210. Reset your micro by pressing CTRL-Break, then type OLD or reload the *Programmer's Aid* program. Delete any extra lines you may have entered (like lines 1 to 5 above) and type in these missing lines.

Resave the program using a suitable filename, ie, AID2. The purpose of these extra lines is to allow you to input a work filename. This must be six characters long: if it isn't, you will be asked to enter it again. The idea is that the micro will tack a 1 on to the end of the filename. For example, if the filename TESTER is used, it will become TESTER1. Function key f6 has been defined so that when pressed it saves the program using this name then adds 1 to the number; therefore TESTER1 would become TESTER2; then TESTER3 and so on. Try it out a few times. You will now always have your program saved at various points in its development. If a fatal error occurs – even when using the bad program recovery routine – you can load the last version back in.

Line	Old address	New address
70	&5E00	&2E00
330	&5E00	&2E00
340	&5E24	&2E24
350	&5EB0	&2EB0
360	&5F20	&2F20

Table 1. Addresses to change for mode 2

Finally the last three function keys are defined as follows. Key f7 defines the standard *AU* listing formats, LIST01 and WIDTH 40. Using these options when typing a listing in from *Acorn User* will help you spot any errors. Just look down the right-hand edges of the listings and see where any discrepancies occur, correcting each line as you find them.

Keys f8 and f9 allow you to catalogue both sides of a disc; f8 will also catalogue a tape but on a cassette system f9 is redundant.

Finally f10 performs an OLD and LIST to restore your program should you accidentally press the Break key.

How to use the program

As it stands the program puts the machine code just below the mode 6 screen so it can be used on the Electron or BBC micro. When writing your own programs, neither screen mode nor the value of the Basic variable HIMEM should change. To alter these would mean the machine code (which is placed above a redefined value of HIMEM) could be corrupted and would therefore not function correctly, though you can overcome this by reworking the program slightly. For example, suppose you wish to use *Programmer's Aid* with a high resolution mode such as mode 2. First find the default value of HIMEM in this mode, ie, type:

```
MODE 2:PRINT ~HIMEM
```

The value printed will be &3000. Next subtract &200 from this. Type:

```
PRINT ~(HIMEM-&200)
```

The value will be &2E00.

Now simply change all address references to those shown in table 1.

If you do not feel confident in tackling this listing, you might like to invest in the monthly tape or disc which contains both versions – see page 103 for details.

For the First Byte Programmer's Aid *listing, see yellow pages 109 to 111*

LETTERS

Write to Letters, Acorn User, 142-143 Drury Lane, London WC2B 5TF

REVVING UP THE TIME

Sir, I have been playing *Revs* by Acornsoft for a couple of months now but had never beaten a time of 1.25. Now I have found a way of getting a time of less than 1.00.

It is fairly simple and requires no breaking into the computer program. All you have to do is drive from the start to just before Becketts where you turn round. You then go to and pass the starting post, hit the brakes and reverse past the starting post.

If this is done fast enough then a time below one minute can be achieved. This only works, though, on practice and grid placing time trials.

Ian Biederman
Cambs

1. Now why didn't we think of that?
2. On the subject of cheating, the *Elite* commander editor in the February issue was printed correctly, despite many calls to the contrary (even Bruce Smith is now Elite!). If you do have problems, copies of the monthly disc are still available.

A CASE OF DEJA VU

Sir, I find the new Master series of micros to be a great disappointment as they are a reworking of the original 1981 design for the BBC micro. Many of the new features are quite useful, but overall they can hardly be described as being at the forefront of today's technology. They don't even have a proper internal expansion bus. Most of the features have been seen before, proving that Acorn never throws anything away.

This might be acceptable if the prices were more realistic. £500 for the basic micro! Doesn't Acorn know that Amstrad sell a complete wordprocessing system including disc drive, monitor and printer for £450? The Master 512 at around a £1000 . . . you can get an IBM clone with disc drives and monitor for less! Acorn appears to be living in a world of its own, completely out of touch with what's happening in the market.

Perhaps Acorn is hoping to sell them to existing owners of BBC micros. What they are offering is 80 per cent compatibility with existing software, according to Acorn. The chances are that most owners will have software which won't run on the Master series. It is unlikely that much software will be written to take advantage of the extra memory, unless sales are higher than I anticipate. Most existing Beeb owners would be better off with a shadow RAM board and ROM extension board – much cheaper as well.

No, I don't think I'll be buying the Master 128 at £500 and I doubt if many others will.

Michael Lowe
Essex

COVERING THE GROUND

Sir, Emboldened by your comment to a reader's letter that you welcomed reviews from us I enclose my review of *Go*.

Your magazine is the only one on the market dealing with the Beeb in depth. But aren't you trying to cover too much ground? Business; education; Atom; etc. It used to be a good straight read but now one has to delve and pick and choose – I can, though, understand your problems.

What about more programs for *View* users? Something for radio amateurs – you'd be surprised at the number of Beeb hams there are, all waiting for a program to turn Morse from a shortwave into text on screen, as well as the ultimate, the program that scans hambands and sorts out RTTY from Morse and other digital transmissions and screens it ASCII? Machine code for beginners written by a trained schoolmaster collaborating with a wirehead? The lack of teaching skill is woefully apparent to professionals who read newspapers and magazines as avidly as I do – yet there's obviously a big audience out there!

Finally, how about an interrupt program as follows? It is loaded at the beginning of the day. A call presents text input and time input. Reminders and appointments together with their times of occurrence are input, Break pressed and the day begins. The program stays in memory regardless of what operations are carried out on the machine, except switching it off.

By the way, the Basic extension program (February issue) has bugs, I think. My machine hangs up if I load in more than one program and use these utilities. But it's a nice idea!

Trevor Artingstoll
Essex

We had to return Trevor's review as we looked at *Go* in a previous issue, but his name has gone onto our panel of reviewers.

We're looking into the suggestion, but the BBC's clock is very inaccurate – although it is easy to do on the Master.

There were no problems with the Basic extension software. If readers cannot get it to work, then it is on Micronet or the monthly listings disc.

Take a look at the September '84 issue of *Acorn User* for an article on RTTY. Our June issue will look at communications of this type. As for your machine code suggestion, we're looking into it (also take a look back to 1982 for a machine code series).

LIKE YOUR STYLE

Sir, It is not often I am moved to write to the editor, but after reading recent letters, I feel I should add my comments too.

First, I think the new style of your magazine is a great improvement, in particular the Index is clearer than before. I also prefer to find page numbers in the 'proper' place, but your correspondent Mr Browning does have a point – the type could be bolder. I would like to see *all* the pages numbered.

Second, after typing in the listings, I feel cheated that you do not include checksums for your programs. You say there is not room, but in most cases it would appear that they could be printed at the end of the program line (I know one of your competitors does, but is that a bad thing?).

I was pleased to find the font generator program suite on Micronet, as it saved me typing it in. There is one point I have not seen mentioned – the program cannot be called by *FONT if the *Printmaster* ROM is in the Beeb, unless it is first disabled, as this is a *Printmaster* command. Alternatively one could amend FONT at every occurence to, say, XFONT.

Although not every article is of immediate interest, overall I think your mix is probably about right.

H D Harris
Watford

To answer your first point – we introduced larger type for the page numbers.

Second, as the first magazine to carry checksums, we always provide them on all long assembler programs and are starting to carry more on Basic listings.

To find *Acorn User* programs on Micronet, the numbers are (for software) 600611 and (*AU* page) 60043765.

CLUES TO INCOMPATIBILITY

Sir, I recently upgraded my BBC B to a BBC B + and since then have been experiencing many problems with my old software.

I'd read many articles about he incompatibility of some of the existing software, but one thing they didn't mention was how to spot it. As you may have guessed, this is not an easy task.

The first thing you may see is an advert which doesn't usually go into much detail about the type of machine the software will run on, as it's more concerned with letting you know what's available.

You can try phoning the software houses involved, but this seems to produce the same results. They either don't know, don't care or are in the process of rewriting. I phoned two of them recently and got two completely different results.

The first (Imagine) said that they 'weren't claiming compatibility' and 'either it did run or it didn't'. The second (Doctor Soft) was very polite, and almost apologetic, and said that its product (*Phantom Combat*) didn't run on the BBC B + but they were in the process of rewriting it and would be happy to send me a copy as soon as it was available.

You could also look at the packaging to try and spot the clues as to whether it would run. Some are obvious, like the words 'to run on the BBC B and B+', and some are not; 'to run on the BBC computer'. One thing to look out for is anything that mentions running only on the 1.2 OS.

You can read through all the BBC micro-related magazines for further 'clues'. These are also quite difficult to find, as some of the reviews seem to be only done on the BBC B. I appreciate it may be difficult to review all programs on both machines, but I'm sure that many people like myself would be quite willing to help out. Can I suggest that you print compatibility ratings on your top-selling software chart? This will help the 'plusers' in their quest for software.

Finally, are *Exploding Fist* or *Hyper Sports* compatible?

A Bourne
Beds

This is the start of the Great Compatibility Quest by the readers of *Acorn User*.

We are already working on this problem and ROM compatibility – an issue which we will go into next month.

We got in touch with the publishers of the games you asked about, and neither of them are compatible.

Software houses often do not know the answers to these questions – only you can do the testing – so here's a start. Write in and tell us how you get on.

COMPATIBILITY CHARTS

BBC B+

Title	Publisher	Version	Compatibility	6502 SP	Econet	Tested by	Date
View	Acornsoft	2.1 ROM	□	Yes	Yes	Acorn User	Feb 86
ViewSheet	Acornsoft	ROM	Yes	Yes	Yes	Acorn User	Feb 86
ViewStore	Acornsoft	ROM	Yes	Yes	Yes	Acorn User	Feb 86
UserDump	Redwood	1.6 ROM	Yes	Yes	Yes	Acorn User	Feb 86
UserROM	Redwood	1.0 ROM	Yes	*	Yes	Acorn User	Feb 86
Wordwise Plus	Computer Concepts	ROM 1.4e	Yes	Yes	Yes	Acorn User	Feb 86
Monitor	BBC	ROM	Yes	Yes	Yes	Acorn User	Feb 86
Word Play	BBC	disc/cass	Yes	–	Yes	Acorn User	Feb 86
Doctor Who and the Mines of Terror	Micro Power	ROM	No	–	–	A Bourne	Feb 86
Match Day	Ocean	cassette	No	–	–	A Bourne	Feb 86
Castle Quest	Micro Power	cassette	No	–	–	A Bourne	Feb 86

MASTER

Title	Publisher	Version	Compatibility	6502 SP	Econet	Tested by	Date
UserDump	Redwood	1.6 ROM	Yes	Yes	Yes	Acorn User	Feb 86
UserROM	Redwood	1.0 ROM	Yes	*	Yes	Acorn User	Feb 86
Wordwise Plus	Computer Concepts	ROM 1.4e	Yes	Yes	Yes	Acorn User	Feb 86
Monitor	BBC	ROM	Yes	Yes	Yes	Acorn User	Feb 86
Word Play	BBC	disc/cass	Yes	–	Yes	Acorn User	Feb 86

ELECTRON

Title	Publisher	Version	Plus 1	Plus 3	Tested by	Date
UserDump	Redwood	ROM[1]	Yes	Yes	Acorn User	Feb 86
UserROM	Redwood	ROM[1]	†	Yes	Acorn User	Feb 86
View	Acornsoft	cartridge[2]	Yes	Yes	Acorn User	Feb 86
ViewSheet	Acornsoft	cartridge[2]	Yes	Yes	Acorn User	Feb 86
Adventure	Micro Power	cassette	Yes●	–	Micro Power	October 84
Bandits	Micro Power	cassette	Yes●	–	Micro Power	October 84
Chess	Micro Power	cassette	Yes●	–	Micro Power	October 84
Croaker	Micro Power	cassette	Yes●	–	Micro Power	October 84
Cybertron	Micro Power	cassette	Yes●	–	Micro Power	October 84
Danger UXB	Micro Power	cassette	Yes●	–	Micro Power	October 84
Draw	Micro Power	cassette	Yes●	–	Micro Power	October 84
Invaders	Micro Power	cassette	Yes●	–	Micro Power	October 84
Ghouls	Micro Power	cassette	Yes●	–	Micro Power	October 84
Killer Gorilla	Micro Power	cassette	Yes●	–	Micro Power	October 84
Intergalactic Traders	Micro Power	cassette	Yes●	–	Micro Power	October 84
Positron	Micro Power	cassette	Yes●	–	Micro Power	October 84

Key: 1 = requires ROM expansion board; 2 = requires plus 3; * = some compatibility; † = high level of compatibility; □ = patch carried in *Acorn User*, June 1985; ● patch available from Micro Power

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LETTERS

PRAISE FOR THE DISC

Sir, The long wait for December's listings on disc was certainly worth it. I would just like to thank all those involved in its production, their effort really shows from the superb index to the way the listings are set out. Thank you.

Could you review more games, perhaps: *Citadel, Dr Who and the Mines of Terror, The Way of the Exploding Fist, Nightshade, Gyroscope* and *Twister*. These are all available for the BBC B and a review would help me decide which to buy.

Also, is Odin Software converting *Nodes of Yesod* for the BBC B?

Paul May
Liverpool

First of all, apologies to all readers for the delay in receiving sofware. Thank you for your patience and comments. We've revised our production process and sincerely hope it will work smoothly in future.

We've been unable to contact Odin Software – does anyone know the answer?

The first three games you mention have already been reviewed. Reviews of the others are underway.

FROM BAD TO WORSE

Sir, Although I enjoy reading your otherwise excellent magazine, I am often irritated by your games reviews. Some of these provide little more than a description of the game, with any comments on graphics/sound/ addictiveness coming as an afterthought. Since this sort of information can just as easily be taken from advertisements, just what are these reviews supposed to tell us?

Two good (bad?) examples are provided in the January issue – the review of *DeathStar* and *Match Day*. In the former the short comment on the game's quality is left to the very last line. The latter, while readable, is even worse – there is not a single indication of how good or bad the reviewer though the game was!

Admittedly the other reviews in that issue were reasonable, but perhaps you could consider introducing a ratings system of some sort? At least then we might get an idea of whether a game is worth spending money on.

Jonathan Temple
Nottingham

RAFS ON THE BEEB

Sir, In the January *Acorn User* there was an article on the relative merits of Mallard Basic and BBC Basic. On page 142 the article states: 'The main omission from BBC Basic is the ability to handle random files'. Now this is true from a language standpoint – there is nothing like the FIELD statement in BBC Basic, but this certainly does not mean that random access files cannot be used with success by any BBC micro equipped with disc drives.

For my former employer (I am a pensioner now), a middle-sized iron foundry in the Netherlands, I wrote a set of programs for a BBC micro, centred around random access files. Each record can be individually called up and written back to its original place in the file. The main file at present contains close to 1000 records of 150 bytes each; 142k according to the CP/M facility STAT, and is still growing.

Each record of this file has 25 fields containing all data needed to identify and calculate the cost price of a casting. When a pattern number is typed in (in this case a five-digit integer), the average time taken, between the moment the Return key is hit and the appearance on the screen of the contents of the 25 data fields for that particular casting, is less than two seconds. This figure was found in a test with 24 different pattern numbers taken at random from the file. The shortest was 0.53 seconds, the longest 3.81 seconds. These times were determined with the aid of the computer's own TIME function.

Ninety-nine per cent of these programs are written in BBC Basic. The remaining one per cent is a short sort program written in Z80 assembler which is included in the Z80 package, and that is used to sort keyfiles in a processing run each morning. The Z80 second processor was only chosen because the main data file was expected to exceed the capacity of one side of a single density 80-track disc. CP/M treats both sides of a physical disc as if they were one. Also CP/M does not know the CANNOT EXTEND error. Apart from these considerations even a standard BBC micro would have served the purpose. A twin 80-track disc drive is a must.

C O den Ijzerman
The Netherlands

AMPLE MUSIC

Sir, Since the introduction of the Acorn Music 500 Synthesiser *Acorn User* has published several articles on computer music, MIDI interfaces, Ample, related software, etc, and we'd like to tell readers interested in the subject about our user group.

It is called the Ample User Group Holland, and anyone who wants more information should send a large international sae to us at Karperdaal 58, 2553 PJ Den Haag, The Netherlands.

We won first prize in a contest on Dutch television. The task was to write a program, using a home computer, that could play the theme tune of a well-known consumer programme. More than 70 entries were submitted, and Ample won! As a result, you can now hear and see the Acorn Music 500 Synthesiser playing the theme of *De Konsumentenman* on VARA Nederland 1, every month.

Ample User Group Holland
The Netherlands

PLEA FOR A PATCH

Sir, I have been reading *Acorn User* from the very first issue and think it is a thoroughly good magazine. I am very interested in your recent articles on sideways RAM and have 16k RAM installed on my ROM board. Do you sell your disc containing 27 utilities supplied in pack 2 of *UserRAM* separately, as I am sure many people besides myself would like to buy it?

One article, guaranteed to sell more issues of *AU* for you, would be on implementing a DFS patch in sideways RAM, leaving PAGE at &E00.

Russell Collingham
Derbys

The 'extra' utilities supplied with *UserRAM* are, with one exception, all taken from *The BBC Micro ROM Book* by *AU* technical editor, Bruce Smith. A disc of these can be obtained by sending a cheque or PO for £7.95 payable to Lovebyte to Bruce c/o the *Acorn User* office. Please specify 80 or 40 track.

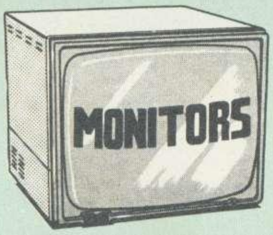
JUMP ACROSS THE OCEAN

Sir, I thought your readers would be interested to know of a small 'bug' in *Citadel*.

Take one of the trampolines across the island to the right-most room (location 18:0 The Ocean). Jump on the trampoline three times. On the third jump move left until you go off-screen then immediately move right to return to the trampoline. Eventually enough height can be obtained to reach the room *above* The Ocean – which is the title screen!

Although nothing useful can be achieved here you can jump off to the right and will fall back to the Top of Castle, though the coordinates will be incorrect.

M Young
Sussex



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14″

- 1431 – Medium resolution as used on the BBC television computer programme **£179**
- 1451 – High resolution, suitable for word processing in mode 0 .... **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£385**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£269**
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- KAGA KX1201G Hi-res Green Monitor **£90**
- KAGA KX1202G Ultra-Hi-Res Green Monitor **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor **£210**
- KAGA Vision 3, Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in either Green/Amber or White reverse **£330**
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FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14″ RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

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"Test Bureau Recommended for use in Education".

12″ high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)

Green (New Design) Hi-res **£72**
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LEADS

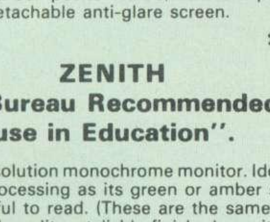
BNC Lead for Zenith or Philips **£3**
RGB lead for KAGA **£3**

N.B. Carriage on Monitors **£7** (securicor)

CREDIT CARD Orders (ACCESS or VISA) Simply phone (0923) 33383/50234 24 Hour Ansaphone Service

SWIVEL BASES

for Video Monitors



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12″ Monitors **£14**
for 14″ Monitors **£16**
(carr. £2.50)

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £1.85
27128-250nS £2.55

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.50
2 × 6264LP (16K) £6.70

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE
BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

MARK II LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.
The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£25**

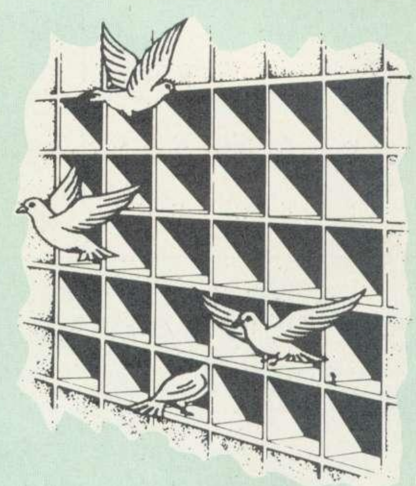
Watford Electronics' Overseas Dealers:
Absolute Electronics, 483 Centre Road, Bentleigh, Victoria, Australia 3204. Tel: (03) 557 3971
First Ludonics International, 2400 AJ Alphen aan den Ri jn, Nedherlands. Tel: 01720 72580.
Scientex PVBA, Willem Ogierplaats 2 B-2000 Antwerpen Belgium. Tel: (03) 233 59 06
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SPECIAL BULK OFFER ON 5¼″ DISCS

(Lifetime warranty on Discs)

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20 × S/S D/Density 48TPI	**£17**
20 × D/S D/Density 48TPI	**£21**
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50 × D/S D/Density 48TPI	**£56**
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DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £14**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £25

(Please specify 40T or 80T disc

Continued ⟶

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£47**
- *Acorn's DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.
Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.
Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

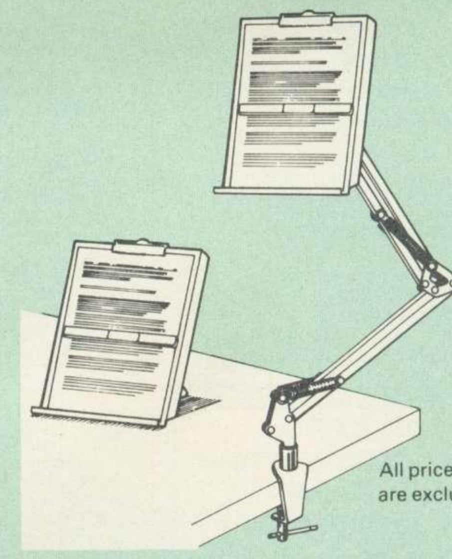
DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.
The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!
Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

COPY HOLDERS



All prices in this advert are exclusive of VAT.

How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.
Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.
Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.
The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.
Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

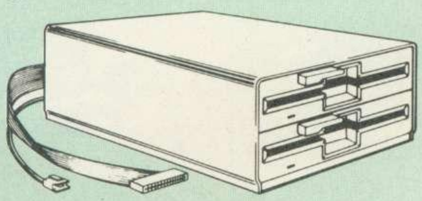
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £75		CS 100 £110	
200K (360K)	CLS 200 £91	CLD200 £169	CS 200 £110	CD200 £185
400K (720K)	CLS 400 £96 / £98 CLS400S	CLD 400 £169	CS 400 £115 / £117 CS 400S	CD400 £182
800K (1.44M)		CLD800 £181 / £183 CLD 800S		CD 800 £197 / £199 CD 800S

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£15**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£22**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£22**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**
- **3"** *Double Sided Discs* **£4** *each*

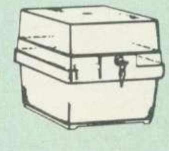
DISC ALBUMS

Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£1.80**

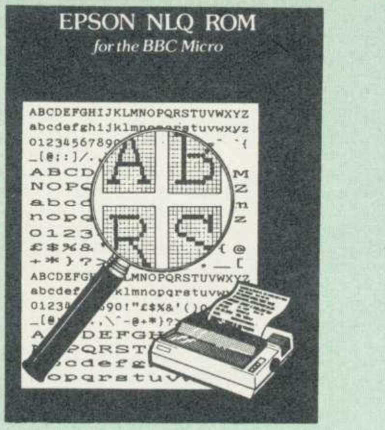
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

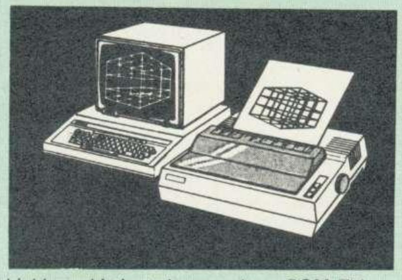
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

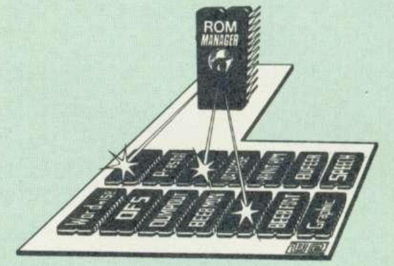
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

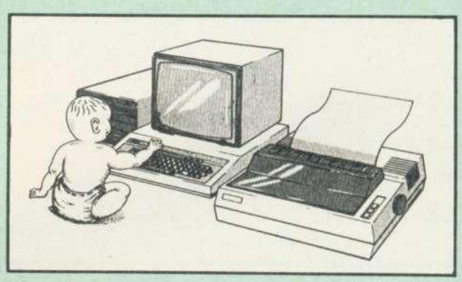
SPECIAL OFFER £18

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM

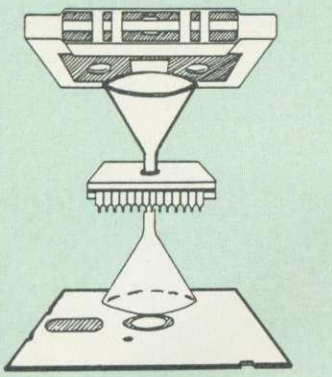


This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £25

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

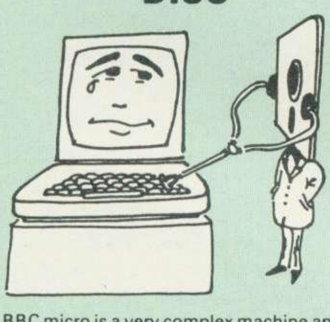
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

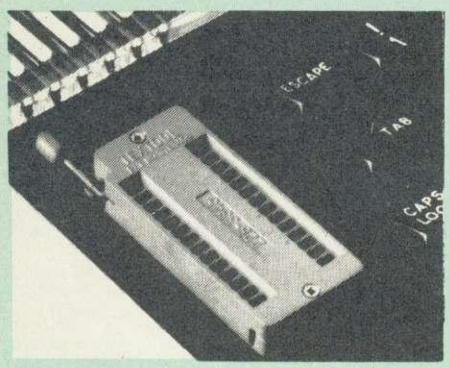
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued →

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

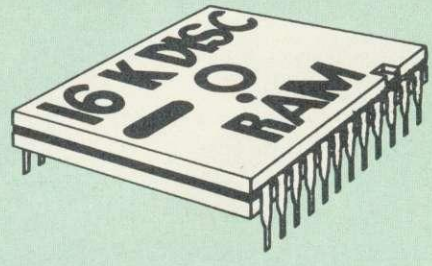
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices exclusive of VAT



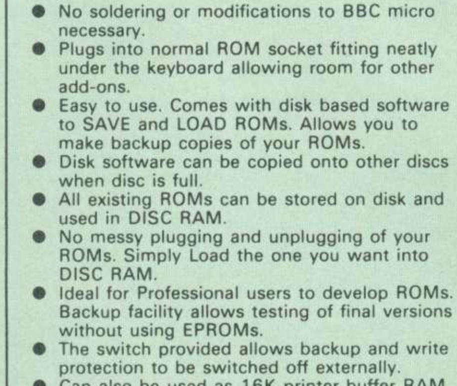
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

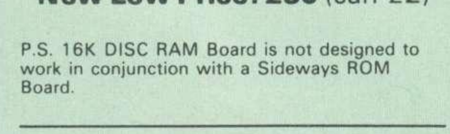
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM

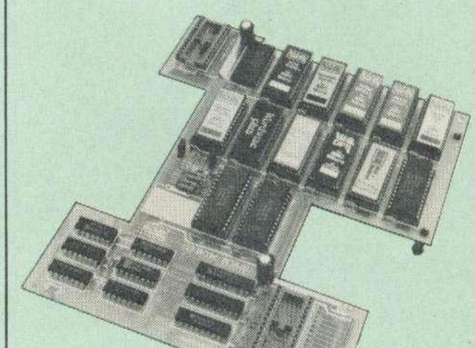




This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

EXTERNAL Sideways ROM BOARD

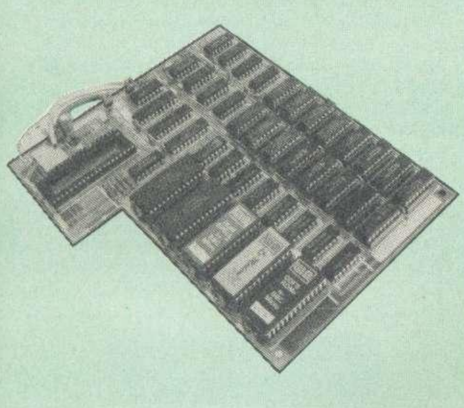
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* — ***£45***
- *ROM/RAM card with 64k dynamic RAM* — ***£69***
- *ROM/RAM card with a massive 128k dynamic RAM* — ***£109***

(carriage on ROM/RAM Card £3)

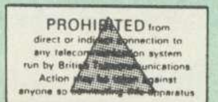
OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* — ***£7***
- *Battery backup* — ***£3***
- *Read and Write protect switches* — ***£2 each***

Complete ROM/RAM board (all options installed) — ***£125***

Le Modem





The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

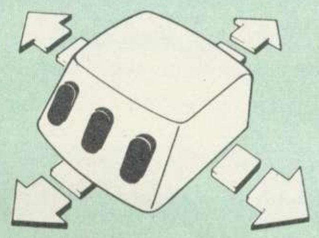
LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65

(carriage £1.50)

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

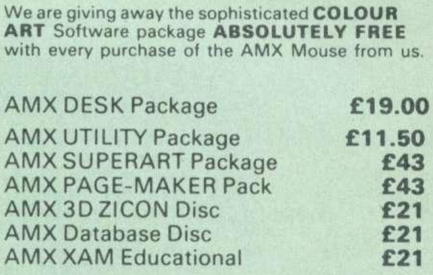
COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£52**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£26**
Disc Doctor ROM	**£26**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

We are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

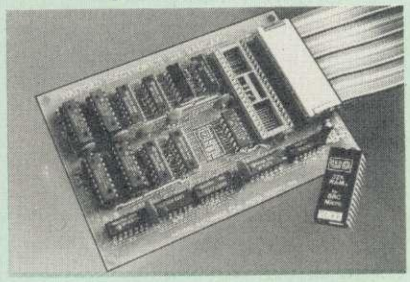
ONLY: £30

GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

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Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

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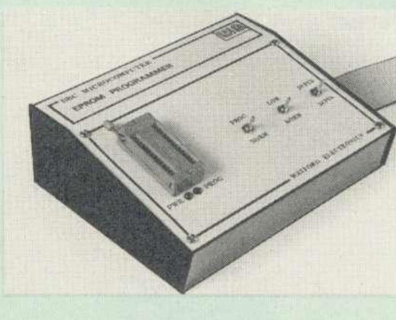
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SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

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EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

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BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£99 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

Magazine Maker

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

£125.00

Continued →

DATAGEM

Now compatible with Watford DFS's

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

£59

L.B.O.

Life & Business Organiser

– the ULTIMATE BBC utility!

A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

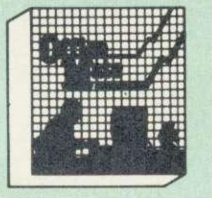
Features include:

- Automatic reminder of entries overdue for attention.
- One week's advance notice of forthcoming events.
- Urgent notice board.
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
- Built-in intelligent calendar.
- All data saved to disk.
- Full printer support.
- Easy to follow documentation.

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

L.B.O. Rom only £17

(Also available on DISK)



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Database – Ideal for storing all types of information just the way YOU want. Set up a computerised "card index" system and add record/Data to the file your way. Features include Search; Sort; mathematical calculations; printer routines; datasummaries; etc.

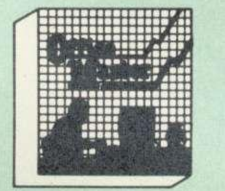
SPREADSHEET – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT – Makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

WORDPROCESSOR – Provides many routines found in large and expensive packages like: Block delete; Block insert; Search & Replace; Edit text; Display text; etc.

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(Cassette or Disc)



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MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock value, current gross margin, cost of bringing stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**

(Cassette or Disc)

For fuller description on any of the software titles on this page, please refer to Gemini's own advert in this publication.

DDD Suite

The Revolutionary 'Triple-D' BBC Disk *Integrated Software System*

-BASE £26

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field.
- Scrolling screen, 79 × 26. Interrupt driven real-time clock.
- Layout painted on-screen to your design, including background text/graphics.
- Fully menu driven, with powerful line editor and access to *OS commands.
- Default entry capability, no need for tedious re-typing of repetitive data.
- Lightning search using advanced 'hashing' techniques.
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- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

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- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor.
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- Send data from all or part of sheet to printer, or just print cell formulae.
- Data over 1 or 2 drive surfaces.
- Fast recalculation, even over large files.
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock.
- Data spool option for merging with other files.
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

-PLOT £26

- Stunning menu driven colour graphics using the BBC's capability to the full.
- Pie charts, histograms, scatter graphs, line graphs and function plotting.
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- Disk save of ALL data.
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- FULL DATA COMPATIBILITY WITH 'DDD-BASE' and 'DDD-CALC'

Combo Pack – All 3 modules £60

Money Management

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

For full details please read Gemini Marketing's advert in this magazine.

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48/4

PHOTOGRAPH BY CHRISTOPHER CORMACK

ME & MY MICRO

Our series on the famous and their micros

Michael Meacher

Imagine it. In 30 minutes you've to face a Cabinet Minister across the floor of the Commons and give the official Opposition response to a major Government announcement.

Yes, it could be just a trifle daunting – but also the time when a BBC micro comes into its own. For when minutes count and there are but a precious few in which to prepare your Front Bench response, it helps to have a Beeb about the House.

Which is why the Shadow Cabinet Minister with probably the most demanding portfolio in Parliament keeps tabs on the Government with an Acorn.



Michael Meacher has been Labour's Shadow Social Services Secretary for a little over two years, and was one of Neil Kinnock's first appointments as Leader of the Opposition.

And as he's discovered, it's a job and a half and he needs all the help he can get. Or as he simply summed up his Beeb – 'It's invaluable'.

Now, of course, in other advanced democracies the responsibilities of even the most ordinary, run-of-the-mill Parliamentarians are automatically seen as requiring proper facilities. Adequate accommodation, sufficient secretaries, research assistants plus the equipment needed to do the job properly.

True, most British politicians can now afford to employ a secretary, but usually just one and sometimes even then they must share with a colleague. Some have researchers, though often these are American students temporarily in Europe for a few months working to add points to their degrees back home.

Members of the Shadow Cabinet do fare somewhat better, but not spectacularly. Certainly nothing compared to the scale of ministerial back-up confronting them across the Despatch Box – and particularly so in the case of Michael Meacher when he faces Norman Fowler over DHSS issues.

This is largely because the Social Services brief is a gigantic nightmare covering two very large, but essentially separate, fields. On the one hand there is a need to keep abreast of the complex, frequently changing field of social security; benefits, pensions, allowances. It's a maze of rules and regulations needing constantly to be learned and understood – particularly now as the Government is in the middle of its long-heralded shake-up.

But in addition there is the whole of the National Health Service and its problems, from ancilliary services to high-tech surgery.

Which is where Michael Meacher's Parliamentary Beeb helps out.

For a start Meacher's assistant, Mary Walker, files much of the Shadow Minister's records on disc for easy recall and up-dating. But it is when Norman Fowler makes a major statement after Questions in the Commons that the Beeb comes into its own.

Take, for instance, the Government's Green Paper on Primary Health Care – a massive exercise covering anything from the future of general practitioners to the state of the dental service, or the integration of the mentally handicapped into the community.

The Green Paper itself took two years to prepare while the Secretary of State's Commons announcement was probably drafted and re-drafted over a period of weeks. It would be unreasonable to expect Shadow Ministers to respond straight off the cuff to such a major statement. So over the years a Commons courtesy has developed. Before Ministers deliver important statements they send copies of what they are to say to their opposite numbers – the Shadow Ministers receiving them half-an-hour earlier!

It doesn't give much time to draw-up a detailed, considered response, but that is what a Minister has got to give, and this is where Michael Meacher finds his BBC micro with a *Wordwise* wordprocessor a blessing.

On the Green Paper, for instance, he prepares in advance a statement dealing with the main aspects of primary health care he believes require attention. As soon as the Secretary of State's advance arrives he and his secretary dash through the two statements to discover what the Government plans and see how his response stands up.

Alterations are quickly typed in, paragraphs added or deleted and as the minutes tick by the response is dumped onto a printer.

Then it's the rush to the Chamber, arriving on the Opposition Front Bench just a minute or so before the Secretary of State is on his feet.

Meanwhile Mary Walker is likely to be tidying up the draft, printing it off again and hurrying copies up to the Press Gallery.

If it helps to have a Beeb around the House, it's also quite handy to have another around the home. Michael Meacher admits that in his North London home his personal use of the Beeb has been confined chiefly to the occasional game of *Hobbit* – also the favourite of his 13-year-old daughter Roslyn.

But it has served as a data file for his wife Molly and has its uses for his eldest son David, a third-year mathematics student at Oxford.

Back at the political asylum, though, the office Acorn is coping with the Parliamentary pressures, proving, as has been said before, the Beeb can easily become a political machine.

Michael Meacher was interviewed by Bill Penfold

PHOTOGRAPH BY CHRISTOPHER CORMACK

COMMANDING IDEAS

Disc and sideways RAM users can add their own commands to Basic using these original ideas

Michael Ginns

My system to allow extra commands to be added easily to BBC Basic – with the utility programs to implement these written entirely in Basic – was presented in the February issue (see end of article for details of ordering back issues). This article extends this original idea for disc and sideways RAM users, by reducing the overall amount of user memory required by the system.

The problem with the system as it stood was that all the utility programs providing the new commands had to be in memory at the same time. However, as only one of the utility commands can be executed at once, only one need be present in memory at any given time. The memory occupied by the other utility routines is effectively wasted.

For cassette users, the serial access nature and low data transfer speeds of the cassette system mean that there is no alternative to this system, so the limitation must be accepted. For disc users, however, the random access capabilities and higher transfer speeds of discs mean that the technique of using memory overlays becomes viable.

This technique, described previously several times in *Acorn User*, involves splitting up a program into separate sections and storing these individually on disc. When the code in one of these sections is needed, it is loaded from disc into a 'buffer area' somewhere in the computer's memory. The code is then executed as if it were a normal program.

The section of code is no longer required when execution is completed, so further pieces of code, if needed, can be loaded from disc to the same buffer area, ready to be executed. Thus only the piece of code currently being executed is in memory at any one time. To control all this loading and executing of program sections, a separate routine has to be resident in another area of memory constantly.

The memory overlaying technique has a wide variety of uses when memory limitation is a problem, but it's especially suitable for our purposes, because the utility program as it stands is already sectionalised in the form of February's individual utility functions. Each of these is self-contained and works independently of the other utility functions. There is no reason why each should not be stored on disc separately and loaded in and executed on its own when needed. This is what's done in this new Basic extension system.

In the new system each utility function, instead of being stored consecutively in one 'utility program', makes up a separate Basic program. Each of these is then stored in a separate file on disc. When one of the new commands is entered through the keyboard a file with a corresponding name is searched for on the disc. If one is found it is loaded into memory and executed to provide the appropriate utility command.

The two programs needed to do all this are given in listings 1 and 2 on the yellow pages. These are similar to those given in February but have been expanded to provide the required disc handling.

Listing 1 intercepts Basic's error-handling routine in exactly the same way as before except that it only attempts to execute a utility if the first, non-space, character entered in the command line is a ':'. For example, to use the memory dump utility :DUMP must be entered. If this feature had not been included the system would search the disc every time a mistake error occurred – very irritating, especially if you make frequent typing errors like I do!

Listing 2 is executed by listing 1 each time a possible utility command has been entered and is responsible for examining the command, searching the disc for the corresponding utility and, if it is found, loading and executing it.

My first thought on how to achieve this was to use the chain command to load and run the required utility programs. This approach had to be rejected, because when issued, chain erases all previously set up variables (except system variables). This would mean that each time a utility was used all the current variables would be lost. Not very useful especially if the utility being used was the 'list current variables' one! Fortunately there is another way to achieve the desired effect, and it's possible because of the way in which BBC Basic allows two programs to be held in memory at the same time.

The address of the current Basic program is normally held in the pseudo-variable PAGE.

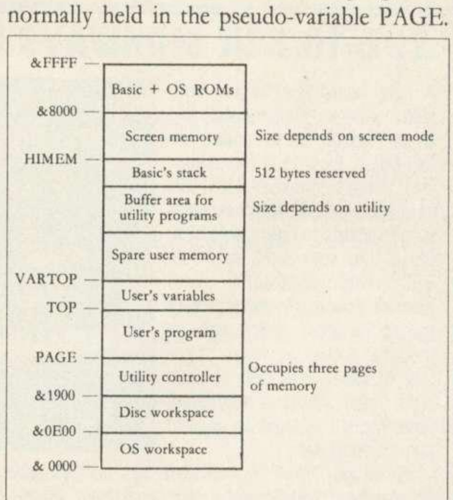


Figure 1. System memory map

However, this can be changed from within a Basic program, while the program is actually running, to point to the start of a second piece of Basic program text. If this is done the first program continues to execute normally until, among other things, a call to a procedure or function is made. When this happens the Basic interpreter searches the program, pointed to by PAGE, for the corresponding procedure/function definition. In other words it will search for and execute the function in the second program held somewhere else in the computer's memory. When this function has been executed the interpreter returns to the statement

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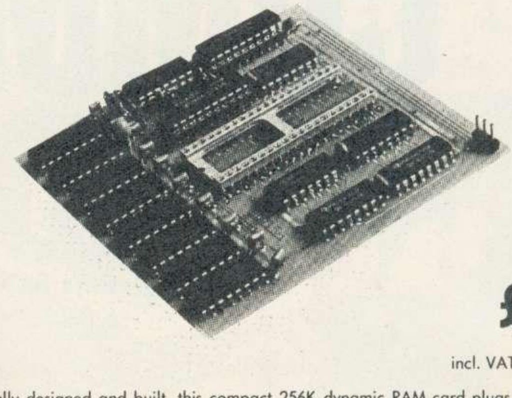
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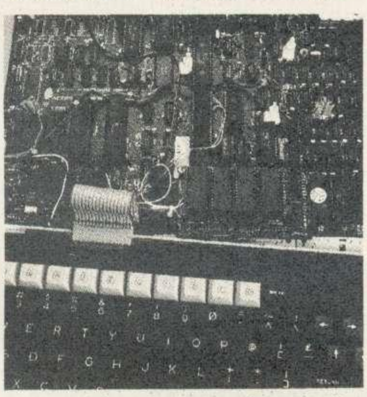
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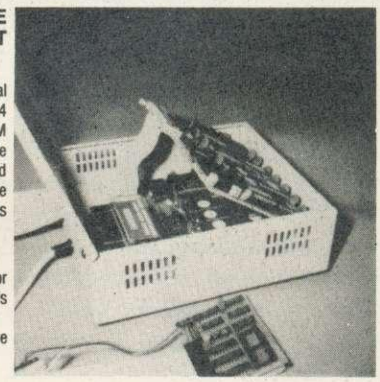
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Unit complete 1 board	**£75.00** (VAT **11.25**) Total **£86.25**
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following the procedure/function call in the original program.

In theory, therefore, you should be able to *LOAD a utility program to an area of memory, set PAGE to this address, and simply call the function contained in this utility program directly. In practice there is a slight complication. When the interpreter first encounters a call to a procedure/function it searches the program for a line containing a corresponding definition. However, it then stores the address of this line so it can jump straight to it, without repeating the search, if the procedure/function is called again. This can cause problems when a new command is used more than once. The first time the command is employed everything proceeds normally; the relevant utility program is loaded, the function is searched for and executed.

When the function is loaded in again, Basic already knows its address and so can jump straight to it. This is fine if it is loaded into the same memory location each time. This will remain the case so long as you do not change the value of HIMEM, either by resetting it or by changing screen mode. If you do the utility will be loaded into a new address that Basic does not know, resulting in a 'syntax error' when you use the utility. The way around this is to enter an extra line into listing 2 thus:

```
115 !&4F6=0
```

The locations &4F6 to &4F9 contain pointers to two linked lists which contain the addresses of functions and procedures that the interpreter has already come across.

Resetting it in this way fools Basic into thinking that the utility function has not been previously encountered and so forces it to search for it in the program text.

Having sorted out this problem the next consideration was where in memory the utility programs should be loaded. One approach is to reserve an area of memory, big enough to hold the largest utility program, exclusively for this purpose and load all the utility programs to this fixed address. This is by far the simplest way but is wasteful of memory.

Loading the utility in memory

A better approach is to see how much free memory is left, after the user's program and variables have taken their share, and use this as a temporary space for the utility programs. After a utility command has been executed the utility program is no longer needed, so the memory can be made available to the user again, and this is exactly what listing 2 does. If insufficient spare memory is available to fit a utility program in, then an 'Insufficient utility space' message is issued and command mode is returned to. The way in which memory is allocated by the system is summarised by the memory map in figure 1.

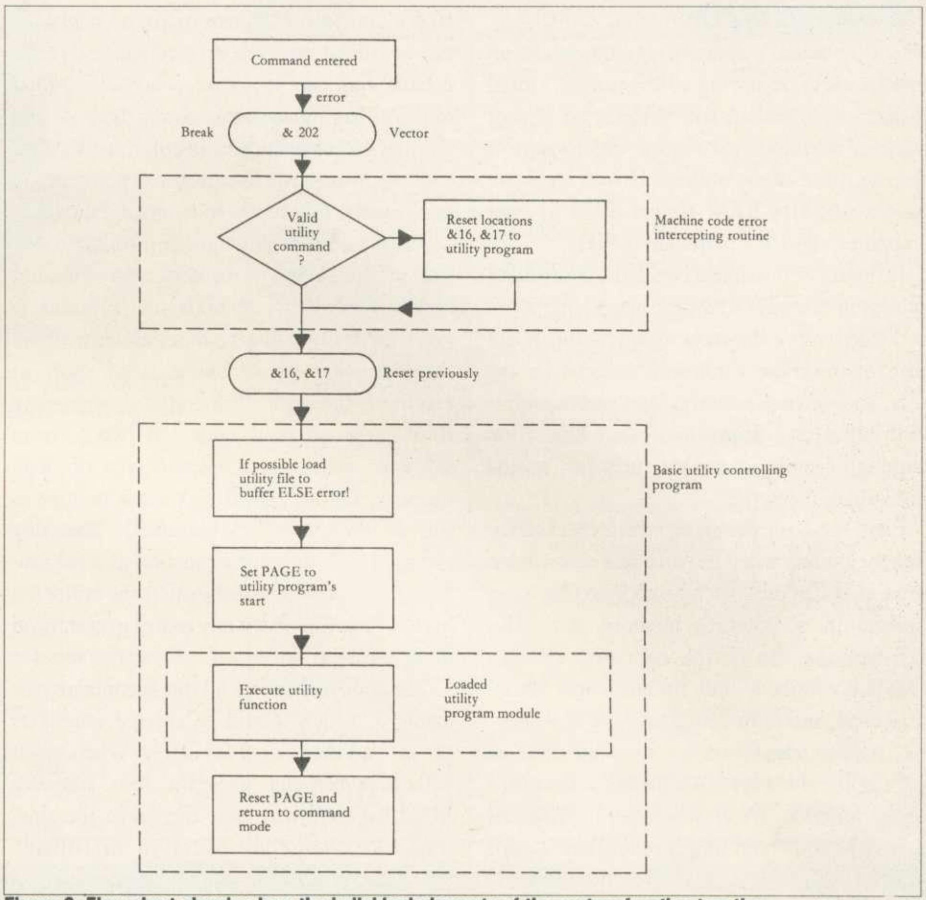


Figure 2. Flow chart showing how the individual elements of the system function together

Note that 512 bytes are reserved for expansion of Basic's stack. This provides a workspace area which Basic will need when executing a utility program. If a particular utility program makes exceptional use of this stack, for example if recursive techniques are used, then this allocation may have to be increased, although 512 bytes was found to be more than adequate for most applications.

The overall method of implementing the disc-based utility system is quite complicated. From entering the utility command no fewer than three separate programs are executed to provide the corresponding utility. To help understand the system as a whole, figure 2 contains a flow chart giving an overview of how the individual elements of the system function together.

When expanding February's system to include the disc routines, particular care was taken to maintain compatibility. This is important as the old system is the only one that cassette users can employ.

To use the new system follow the instruction given on the yellow pages: type in listings 1 and 2 and save them under LANG1 and LANG2 respectively. Then CHAIN LANG1, LOAD LANG2 and finally press the Break key. This time you should be greeted by:

```
BBC COMPUTER
BASIC
Extended Disc Mode
>
```

The utility functions themselves were given in February's issue but instead of adding these on to listing 2 each should be saved as a separate Basic program file on disc. The name of this file should be the same as the name of the function it contains, which in turn should be the keyword required to execute the utility when entered from the keyboard.

The following example is trivial but shows how a utility function should be created – it simply performs *HELP when the keyword :ROMS is entered.

```
1000 DEF FNROMS
1010 CLS
1020 VDU 14
1030 *HELP
1040 VDU 15
1050 =1
```

This should be entered as shown and saved as a Basic program under the file name of ROMS. It will be executed each time :ROMS is entered from the keyboard.

All the example utility functions given in last month's issue of *Acorn User* can be used in the new system, without modification, simply by saving them into a series of appropriately named disc files.

The sideways system

The disc-based utilities program, while an improvement on having all the utilities stored in memory together, still requires an area of memory to contain the routine which controls the execution of the utilities. However, if you have a sideways RAM system fitted to your computer, there is a better alternative.

It should be possible to write the controlling routine in sideways RAM format, so that it can be loaded into a sideways memory slot. It can then monitor the commands entered by the user, and where necessary, load and execute a utility function from the disc. This idea, although simple in theory, presents several difficulties in practice.

First, the Basic program, which checked the disc for a utility when its name was entered, has to be re-coded into machine code so that it can operate in a sideways memory slot. This involves the use of the operating system's OSFILE routine to look for and load a file.

Second, and more importantly, a way must be found to transfer control from the machine code in the sideways RAM/ROM to the user's utility function, which is written in Basic. At first sight you could simply point Basic's error vector (&16,&17) to the address in memory where your utility function has been loaded, causing the utility to be executed instead of the default routine. However when the utility function has finished executing, there is then no way of automatically re-entering the controlling program to reset memory pointers and implement a tidy return to command mode.

To solve this problem the controlling rou tine in the sideways memory area does not transfer control directly to the user's routine. It loads the routine into memory and sets up all the internal pointers, but it stops short of executing the utility. Instead it downloads a short piece of Basic code (26 bytes), from sideways memory to a spare area of main memory. It then sets Basic's error pointer to this so that it will be executed. This tiny program calls the utility function as a subroutine (FN), and is returned to after the utility has been executed so that a tidy return to command mode can be achieved.

The code to perform all this is contained in listing 3, which should be entered exactly as shown and then saved for safety. When run it will assemble the program into sideways ROM/RAM format, and then save the sideways code on disc in a file called 'SIDEBAS'. This file now contains all the code necessary for the system to work. The program in listing 3 can be kept as a backup, but is really no longer needed.

To use the system simply load the sideways RAM as described in your own sideways RAM manual and press Break. If all is well, you should see the normal start up message. Typing *HELP, however, will reveal the presence of the new system.

From now on the utility system is always in operation. It will survive any sort of reset as the equivalent of a utilities chip has been added to the machine.

The new system is used in exactly the same way as the disc only system. Utility functions are prepared and saved on a utility disc. When this disc is present in the drive then typing: <name>, where <name> is the name of the utility, will cause the utility to be executed. This is exactly the same as before and no modification is required, the advantage being that PAGE remains set to &1900 and no user RAM is taken. This provides the most economical way of adding new, user-written, commands to the BBC micro.

You can order copies of February's issue – see page 104

Michael Ginns' three listings are to be found on yellow pages 112 to 114

LEARNING BY THE BOOK

Take a cheap peripheral, the Tandy Electronic Book, and turn it into a budget-priced concept keyboard to amuse and educate the kids

Joe Telford

How can you turn a cheap peripheral, the Tandy Electronic Book, into a low-price concept keyboard of great value in helping children express themselves and developing their data handling skills? Well, that's my subject this issue.

Regular readers might remember my Youngest Users Micro Activity Package (YUMAP), presented in August 1984, which was designed to encourage parents and small children to use the Beeb as a focus for discussion.

To help youngsters to drive the BBC micro I split the keyboard into five sections and marked these on an overlay to cover it. When a picture on the overlay was pressed the keys below were activated and the program came into play.

Pieces of hardware like this are called concept keyboards and are usually fairly expensive. They are very good for use with young children, but apart from price, they pose the problem of knowing what to do with them and they suffer from a dearth of suitable software.

Before investing in one, some cheap experience of this type of hardware and software would be helpful – and this is where the Tandy Electronic Book and the program presented here come in.

This peripheral, at about £20 including connection lead and VAT, is really a disguised concept keyboard. It's good value for money if you accept it has a few shortcomings. (Tandy also produces some Beeb-compatible software for it.) Writing your own software can overcome some of these (figure 1).

The Electronic Book is a large ring binder with a connection lead (figure 2). Its back cover has 12 pressure sensitive pads, marked one to 12, and two identical resistive networks whose contacts are switched under the pressure pads. These networks are brought out at the spine of the book and travel via a connection lead to a Tandy-compatible five pin DIN socket. From here a BBC micro adaptor lead is used to connect to the analogue port.

Running a simple program:

REPEAT P.ADVAL1, ADVAL2: UNTIL FALSE

shows that both channels read low numbers until a pad is pressed. The pads marked one to six generate a signal to ADVAL 2 and pads seven to 12 generate an ADVAL 1 signal. The range is the usual 0 to 65220 and so needs dividing down for accuracy. The simplest approach is:

REPEAT P.ADVAL1 DIV 100000, ADVAL2 DIV 10000: UNTIL FALSE

which returns numbers in the range zero to six for each set of pads. The numbers returned using this program have a problem – they do

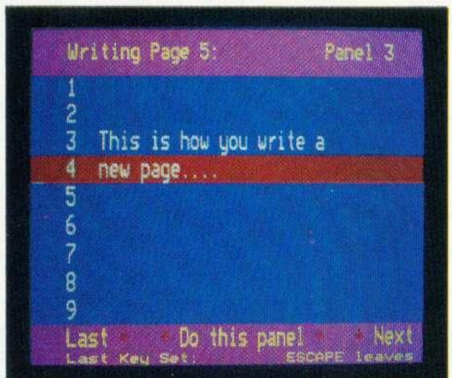


Figure 1. Writing a page using Collections

not match the numbers on the Electronic Book. Try it and you get 1,2,3,6,5,4 instead of 1,2,3,4,5,6 and 1,2,3,6,5,4 instead of 7,8,9,10,11,12. The solution is to use a more complex routine to read the book.

Library routines

There are four basic facilities which prove useful when handling any concept keyboard:

- A simple read of the pads
- A more precise read, removing errors such as switch bounce
- To do the equivalent of GET in Basic
- A facility to read a string of pad numbers terminated by Return.

The Electronic Book can be read using listing 1 on the yellow pages, which can be renumbered to fit in any Basic program. It scans the Electronic Book, first for a value from ADVAL 2 (the low six keys), and if a value is present, corrects it and then returns the value to the calling program. If no value is present, it then checks ADVAL 1 (the high numbers) and again corrects any value and outputs it. If neither channel is reading a value over 0, then the routine returns 0.

Unfortunately the Electronic Book has little in the way of input switch sophistication, and as a result, a certain degree of switch bounce seems apparent. In addition to this, the usual slowness of operation of the analogue chip, as well as system noise, ensures that listing 1 is not always truthful in the values it returns. Try loading it and calling it from this line:

REPEAT: P. FNreadbook: UNTIL FALSE

You can see immediately that spurious numbers appear and these occur mainly just as the pad is being touched. They correct themselves once firm pressure is exerted on a pad.

The usual solution to noisy values from the ADC chip is to read it a few times then average the values, which smooths the reading. Unfortunately this is not viable here because speed of response is essential.

The approach which I decided on was to read the book twice, separated by a 50th second, and if the values on both reads were identical, then I assumed that the reading was valid. The readings continue until both are equal and that value is returned. Look at listing 2, FNpressbook. The repeat loop is between lines 1860 and 1890. Notice that line 1900 is used to prevent auto repeating, which would add further problems.

In order to give aural feedback of a value being read, the VDU7 of line 1890 is included, which is useful in practice. Again the whole routine can be renumbered to be integrated with your own programs. However, remember that the program requires the use of FNreadbook.

In Basic you rarely scan the BBC micro keyboard directly, as there are more powerful tools such as GET which returns a single keypress. Indeed FNpressbook is very much like a GET function, but it can be improved on. One problem with much concept keyboard software is that it can only be driven from the concept keyboard, which is fine for the purpose it is intended for, but the user should be able to use either the concept keyboard or the BBC micro keyboard for debugging and developing materials.

Listing 3 is a routine called FNgetpress,

DIAGRAM BY CHAPMAN BOUNFORD

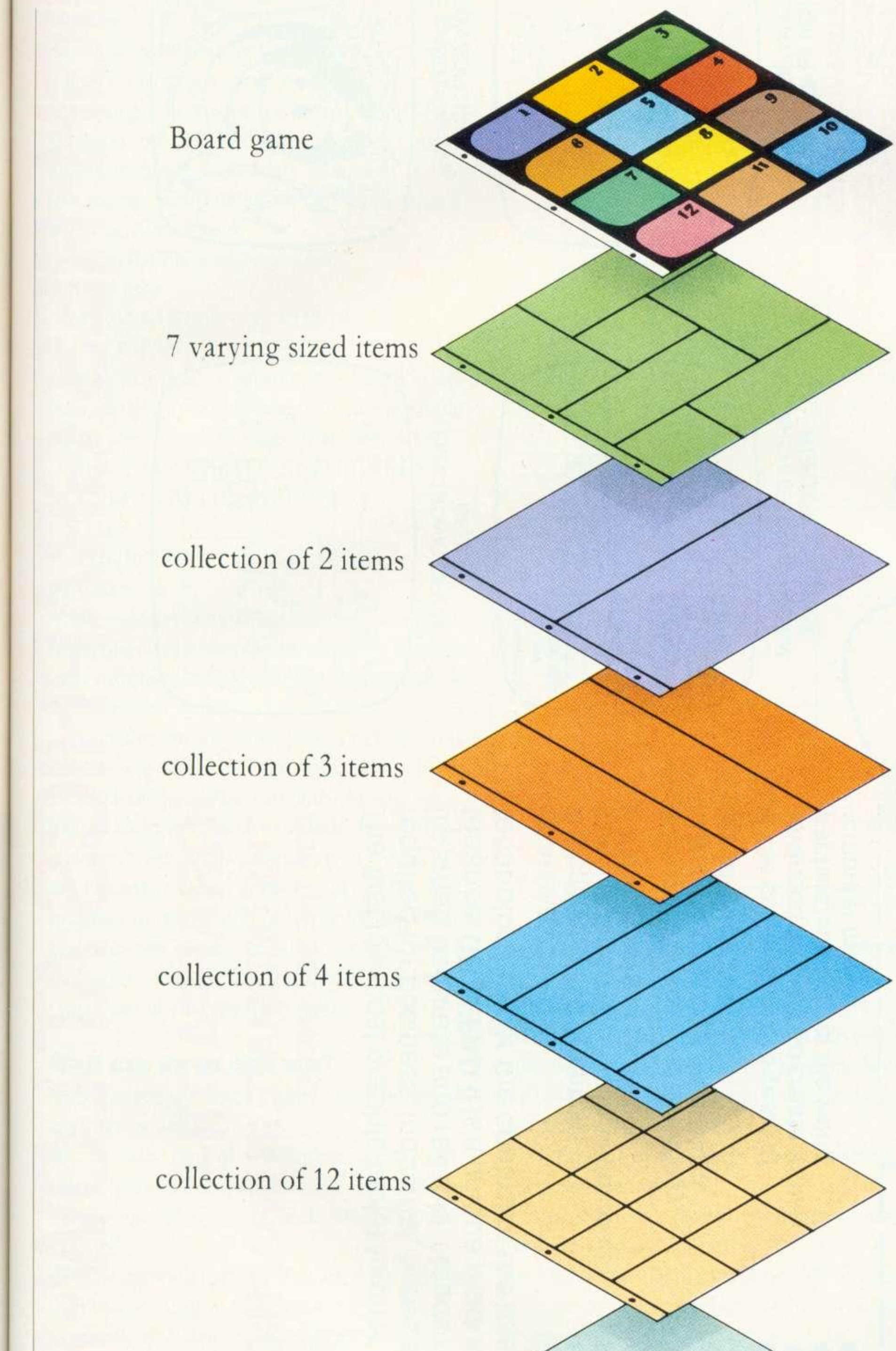


Figure 2. The Electronic Book consists of a ring binder with 12 pressure pads embedded in the back cover

which takes a single reading from either an Electronic Book pad or a keyboard button as a number in the region one to 12. The keyboard keys used are 1,2,3,4,5,6,7,8,9,0, Delete, Return, which match with the pads and the numbers: 1,2,3,4,5,6,7,8,9,10,11,12 so that 0, Delete and Return on the keyboard match with the lower row of 10,11 and 12 on the Book.

Only line 1770 needs more explanation. It refers to a variable D%, which is defined outside the function. Because the Electronic Book operates via the ADVAL channels, if it is not connected, then these channels would return random values which FNreadbook would try to convert. It's possible that a good deal of random and 'invisible' keypresses would be introduced. To prevent this we use a line at the start of the main program which checks for a 0 signal from the book. This will not be the case if the book is disconnected. If a 0 is not read, then the variable D% is set to 1 otherwise it is set to 0. A suitable line is:

```
10 IF FNreadbook <>0 D%=1 ELSE
D%=0
```

The final library routine is for a concept keyboard to be able to return a string of characters terminated by Return. This is the equivalent of Basic's INPUT command. In order to do this effectively on the Electronic Book I decided again to allow the micro's keyboard to be active at the same time as the Book. Whereas previously 0, Delete and Return on the micro became 10,11 and 12 as if pressed on the Book, now I decided that 10, 11 and 12 when pressed from the Book would become 0, Delete and Return. This really requires that the last three pads of the Tandy Book should be labelled with their new alternative functions, as shown in figure 3.

In listing 4 the FNgetpage routine is reasonably simple to follow. The maximum number of digits in the return string is sent to the routine as a parameter. For example, calling the routine with:

```
20 page$=FNgetpage (3)
```

will only allow all numbers in the range 0 to 999 to be entered. Notice particularly that line 1980 checks the micro's keyboard, and line 1990 checks the Electronic Book. Like all the other routines this one returns numbers but this could be altered (I do this in a later program) to return a string. To do this change line 2010 to:

```
2010 IF A$="12" OR A$=CHR$13
UNTIL TRUE:=B$
```

Notice too that D% is here again, because you must check that the Book has been connected. Set D% at the beginning of the program with the routine shown previously, but remember, you should only need to set D% once.

Lines 2040 and 2060 have what looks to be a

complex VDU statement. In fact, this is because the input routine works in double height mode 7 characters, and it assumes that the beginning of both lines have the double height character (CHR$141). This is shown more clearly in figure 4. Readers who wish to use this routine at any point on the screen should alter line 1930 to read:

```
1930 DEFFNgetpage (x,y,len)
```

and add lines:

```
1932 P.TAB (x-1, y-1); CHR$141;
1934 P.TAB (x-1, y); CHR$141;
```

making sure that x is greater than 0 and y is less than 24. If you simply wish to work in single height alter lines 2040 and 2060 as follows:

```
2040 IFA$=CHR$127 AND LENB$>0
B$=LEFT$(B$,LENB$-1):VDU127:
UNTIL0
2060 IFLENB$<len VDUASCA$:
B$=B$+A$
```

These routines should be typed and saved as a spool file, so that they can be merged with your own programs which can then be applied to the Electronic Book.

If you're at all into programming, this whistle-stop tour of the Electronic Book should have provided you with enough information to drive the beast yourself. However, if you don't feel up to programming, or indeed are uncertain as to what would be the best program to implement on the Book and Beeb, then the next section details a package which will allow you and your children to explore a typical use of concept keyboards.

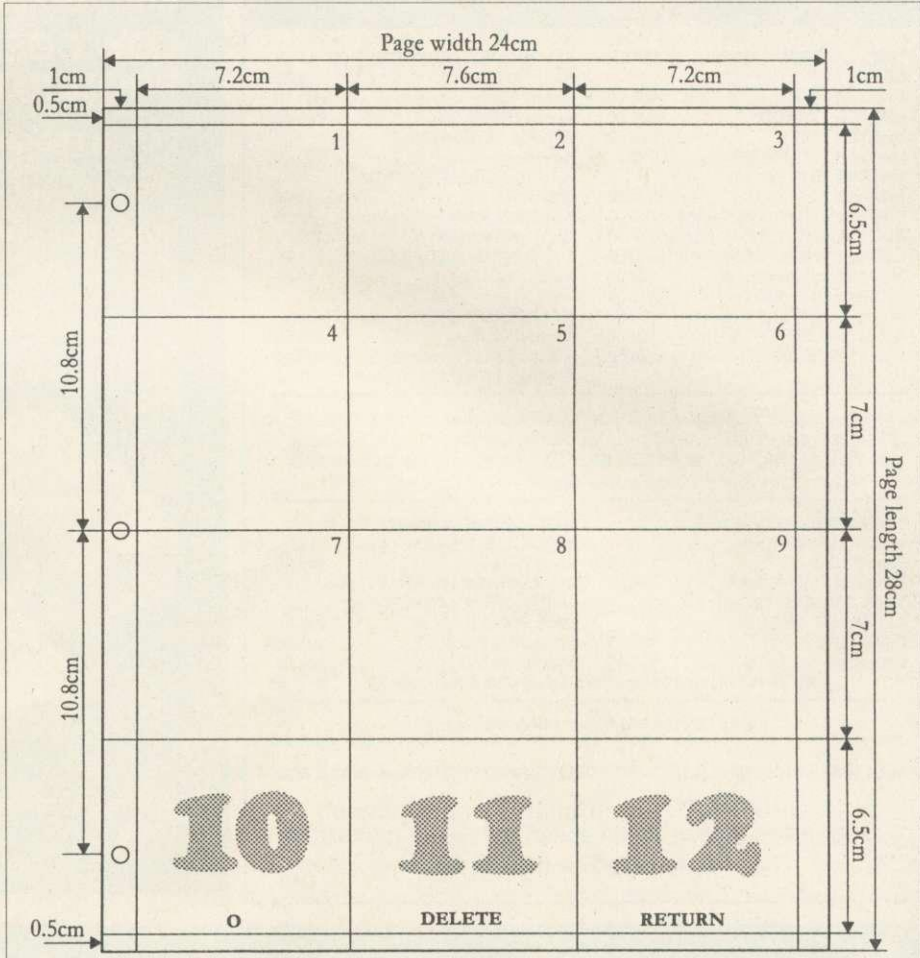


Figure 3. Draw up your overlays using this template. The bottom row shows the new alternative functions

What can we do with one?

Well, anything which lends itself to these facilities on offer:

- An easy way of overlaying words, sentences, pictures or diagrams and then indicating to the computer which item is being touched
- The computer screen is an ideal format for well laid out bright, bold, neat text

Generally it is easier to cut and paste or hand-draw diagrams and pictures than it is to create them as computer graphics. It is also true that children find it both easy and satisfying to create text on a computer screen. We might, therefore, create a system where children generate their text and provide overlays of pictures using the Book as a vehicle for their presentations.

In the process of designing pages, adding text, using resources, and collecting items, children may acquire a number of useful skills under adult guidance. For the less able, or very tiny there is much joy to be gained even if all that can be achieved is the recognition of words and pictures previously prepared by Mum, Dad or teacher.

Collections

The *Collections* suite of programs in the yellow pages takes up the idea of an Electronic Book as a book to which children contribute pages. Each page has two formats:

- A physical overlay page which contains a collection of things
- A page-number file on disc which contains text describing the collection

The idea is that children will be able to touch the items in their collections and by so doing get information about each item.

Typical collections might include shells, stones, seeds, twigs/buds, flowers, football cards, stamps or coins, photographs, drawings or a map with locations indicated on each panel, can or bottle labels, a cartoon strip or a simple board game.

Each page can have a complete collection of up to 12 items or the collection can extend over a number of pages – and the Electronic Book can hold as many pages as there are files on a disc. On the BBC micro, each panel is allocated nine lines of 32 characters for text, and this is presented in double-height letters. The complete system works with all versions of the BBC micro including Econet but not on the Electron or on cassette-based systems.

There are three programs in the package, and they communicate and cross-chain with each other. They must be placed on disc as "Content", "WriteBk" and "ReadBk". They should live on an initially clean disc with the pages they create. Once a disc is full, they should be copied to a clean disc and another collection begun. You start by typing:

```
CHAIN "Content"
```

or by *BUILDing a !BOOT file:

```
*BUILD !BOOT
0001 MODE7
0002 CHAIN "Content"
<Press Escape>
*OPT4,3
```

and then using Shift/Break. Let's run through how to drive the package.

Once the Contents program is loaded, the message: 'Press any number' is displayed, and touching a panel on the Book or a number on the keyboard causes the list of options to appear:

1........................Read a Page
2........................Write a Page
3........................Alter a Page
4.................... Tear out a Page
5........................ Copy a Page
6................Close Book (End)

Pressing the number activates that option. Items 1,2 and 3 call up ReadBk and WriteBk as appropriate.

Option 6: Close Book (end) simply exits the program unceremoniously, with a 'done!' message. Option 5: Copy a page allows a file to be replicated as another one with a different file number – useful for making a number of pages which are similar. A directory of pages which can be copied appears, and the required page number can be typed (up to 999). You can do this either from the Book using 10,11 and 12 as 0, Delete and Return, or from the keyboard.

Next a directory of pages which cannot be the target of a copy appears, and the target page number can be typed (up to 999). This can be done either from the Book using 10,11 and 12 as 0, Delete and Return, or from the keyboard.

If a problem occurs with the filename typed, an error message is displayed and then the program restarts. If an acceptable filename is entered, then a further screen asks:

1............ Copy to page XXX
2................ Cancel Command

and hitting the appropriate number causes that action to occur. The program then restarts. Hitting Escape at any point in this option aborts the option and the program restarts.

Option 4: Tear out a page allows a file to be deleted from the disc. This option works in the same way as option 5, but deletes a page rather than copying it. A directory of pages which can be removed is displayed.

Option 1: Read a page first asks for a page number as shown above and then calls the ReadBk program, which loads the file required and displays the text for panel one. Pressing any number on the keyboard will display that panel (remember 0, Delete and Return act as 10, 11 and 12). The other and more useful facility is to use the Electronic Book as this option is where the Book comes into its own.

Place the overlay, which could actually be stored in the ring binder section of the Book, over the back cover and if necessary hold in place with elastic bands. Pressing any item on the overlay should cause the panel beneath it to be pressed and the text for that panel to appear on the screen. If after working with the page, another collection is required, simply press Escape (on the BBC micro) to return to the contents page.

Options 2 and 3: Write and alter a page. These options first ask for a page number as shown above and then call the WriteBk program. The only difference is that if option 3 is chosen then the file selected is loaded from disc and can be edited. If you pick option 2 then a blank file is created for writing into.

Whichever option is called, the WriteBk program is controlled in the same way. When first entered the program is in 'Scan' mode, ie, pressing the Cursor Left and Right keys will let you preview the text in every panel by moving forward or backward through them. If you press Escape or press the Cursor Left and Right keys for long enough, you eventually come to a Panel zero. This is the only legal way out of WriteBk. Pressing Cursor Up here saves the current file and then returns you to the contents page.

The Cursor Up key has another effect when you are scanning: pressing it while looking at any panel from one to 12 will take you into Edit mode.

Edit mode is indicated by a red editing bar on the screen. This is normally over line one of the current panel, but when in editing mode the bar can be moved up and down using Cursor Up and Down keys.

Once a line has been selected for entering or editing data, simply move the bar to it and press Return. Type your text into the line using the BBC micro's keyboard (even the function keys 1 to 9 will work) and when satisfied, hit Return. The red bar will flicker and the line may tidy itself if the original line was longer than the one just entered. The bar can now be moved up or down to another line and the process repeated.

Once you are editing a line any characters typed other than Delete and Return will erase its original contents.

To ease the removal of whole lines, red function key 0 will erase any line on which the red edit bar sits. Just move the bar to the offending line and press f0. The line will vanish, and the bar can be moved.

Remember the red bar can only be moved if you are not typing inside it. If you are, then press Return to allow the bar to move.

Edit mode can only be left from a completed line, ie, the red bar should move freely up and down. If this is the case then pressing Escape will return you to Scan mode.

As an example, let's imagine that you have just loaded a page and want to alter line five of panel four to read 'Hello Cheeky'. These are the actions.

- Press Cursor Right until panel four shows
- Press Cursor Up to enter the panel (Edit mode)
- Press Cursor Down until line five is reached
- Press Return to enter the line
- Type 'Hello Cheeky'
- Press Return to leave the line
- Press Escape to return to Scan mode
- Press Escape to return to panel zero
- Press Cursor Up to save the file and return to the contents page

I've already mentioned that function key contents can be printed out within the Edit mode. In order to load function keys with new strings you must be in Scan mode. Now simply hold the Shift key down and tap any function key 1 to 9. This will assign the string in the matching line on the screen panel, and a message at the bottom of the screen will confirm the setting.

For example, if you wish to load the string 'Hello Cheeky' into a function key you must scan the panels until the string is found, then assume the string is on line 4. Finally you should press Shift and f4 to set the key f4 to be 'Hello Cheeky'.

Obviously if all the panels are empty, one panel will need to be created with all the keystrings. Once done, they can be loaded into function keys as described above, and then the panel can be edited clean. Note that setting a function key to a blank line clears that function key. This is useful if you need to reallocate space for a new function key, and a 'Too much set in function keys' message has appeared.

The main use of function keys is to duplicate panels or parts of panels. To copy panel one to panel eight (for example):

- Scan to panel one
- Enter it and type the line needed to create the text
- Return to Scan mode
- With the Shift key held, tap each function key in turn
- Scan to panel eight and enter Edit mode
- Move to the desired line
- Enter it, press the function key required, then press Return
- Repeat the last two steps until the new panel is complete

As you can see, almost anyone, even adults can create the text for the collections. It's equally easy to create overlays for the Book.

Creating overlays

Figure 3 shows the layout of a template overlay, to half scale. To make your own overlays from this, duplicate the layout on card or cartridge paper, with all measurements twice as large. Rule the card with faint pencil lines so that the target panels are visible, and

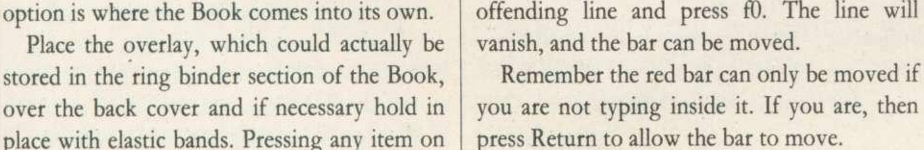


Figure 4. How the double height routine works

faintly number each panel. Once a particular overlay is finished these pencil marks can be rubbed off. If you wish, the left-hand side of the card can be punched to fit the ring binder of the Tandy Electronic Book. And *always* put the page number somewhere on the overlay – or confusion will result.

Now it's down to you to stick your collection on the card in your chosen layout. Remember that you can use two or more panels to accommodate an item, provided you place information about that item in both panels in WriteBk. Figure 2 shows some typical layouts for collections.

If the finished product is to be used regularly, then flat collections can be covered with laminate or transparent book covering material. Disposable collections of duplicated sheets for cartoon strips, games, diagrams and maps can provide follow-on colouring activities for children. In this case each child will have an overlay, while the parent, teacher or another group of children provides the text.

All the activities which the children are engaged in with this program are reliant on the fundamental skills of data handling. Data capture is there, putting the collection together physically. The validation is present, in researching the items of the collection. The searching, sequencing, sorting and ordering is represented in preparing both the text and overlay. The presentation of the finished package by different children is the first foot on the ladder to report generation. Although there is a good deal of enjoyment in using this package, there is also a considerable amount of learning.

Inside Collections

This section details the major elements of each of the three programs making up the Collections suite. The two programs WriteBk and ReadBk are chained from Content, so there must be some means of communication between programs. The technique used is by passing values to integer variables. The ones used in the package, along with their meanings are shown below.

Transferable integers:

B% Contains the current filename to read or write. This is only used with C% = 1, 2, or 3.

C% Contains the current option:
C% = 1 only ReadBk can be chained
C% = 2 only WriteBk can be chained using a blank textfile
C% = 3 only WriteBk can be loaded using an existing textfile
C% = 4 no change of program – Content does Delete file
C% = 5 ditto but copy file
C% = 6 program concludes.

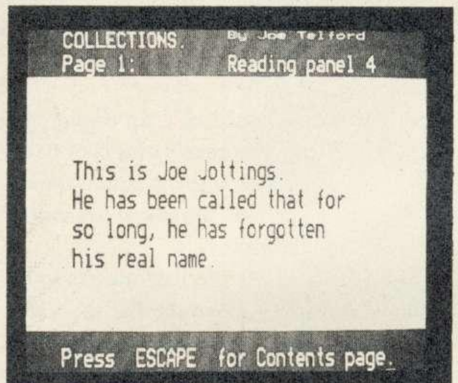
D% Contains the flag indicating Book present:
D% = 0 Book present
D% = 1 Book not present

H% Contains the file handle when checking for errors. Only used inside Content.

L% The accessibility of the options. Normally all six options are available, but if L% is set within a !BOOT file to less than six then only the options up to L% will work. For example type:

L% = 3
CH. "CONTENT"

and only options 1, 2, and 3 are available. This is useful when allowing children to access only part of the package, for example, to read pages enter:



Reading a page created on collections

L% = 1
CH. "CONTENT"

If L% is accidentally set low, then the only cure is:

BREAK
L% = 6
CH. "CONTENT"

oscar% This is the address of a control block to enable OSCLI commands to be obeyed on all machines.

buffer%, file% Two synonymous variables pointing to the start of the RAM image of the current file.

Procedures and Functions in Content

title Prints out title page and waits for start keypress.
error Error handling routine for system errors. Users can add to this if problems arise.
delete Routine to delete a file from disc.
copy Routine to replicate a file on disc.
copyfile Utility routine to do the copying.
oscar Utility to do OSCLI on all machines.
err Routine to handle user-generated errors used in co-operation with PROCerror.
FNrwatc Menu routine to return option requested.
FNmenu Routine to CAT disc and return page number.

Plus the original library routines for the Electronic Book as detailed earlier.

Procedures and Functions in WriteBk

erasearray Creates a blank RAM image file for writing.
loadarray Loads a RAM image of an existing file.
error Error handling routine for system errors. Users can add to this if problems arise.
oscar Utility to do OSCLI on all machines.
err Handles user-generated errors used in co-operation with PROCerror.
setfkey Sets a function key to a particular string.
savearray Saves the image of the file back to disc.
update Controls Edit mode movements of the bar.
getline Handles the input of text to one line of a panel.
down Moves the Edit bar down a line.
up Moves the Edit bar up a line.
showbar Initiates the printing of a panel and then superimposes the red bar.
printpage Prints a panel of text.
panel0 Handles imaginary panel 0 in Scan mode to give an escape route.
FNshowpanel Handles printing of a panel in Scan mode. Returns next action as a keypress.

Plus the original library routines for the Electronic Book as detailed earlier. Note that FNgetpage is slightly altered to accept all characters from the BBC micro keyboard, so that text can be input.

Procedures and Functions in ReadBk

loadarray As WriteBk
printpage As WriteBk
showpanel As WriteBk
oscar Utility to do OSCLI on all machines.

Plus original library routines for the Electronic Book as detailed earlier. Note that FNgetpage is not used.

See Joe's Electronic Book listings on yellow pages 114 to 118

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SPRAY AWAY

Create professional-looking three dimensional graphics using spray painting techniques and angled lighting

Peter Voke

Creating convincing images of three-dimensional objects on a computer screen is exciting and instructive. The best three-dimensional graphics, produced at considerable expense on fast supercomputers, are so realistic that you can easily be fooled into thinking they are photographs of real objects.

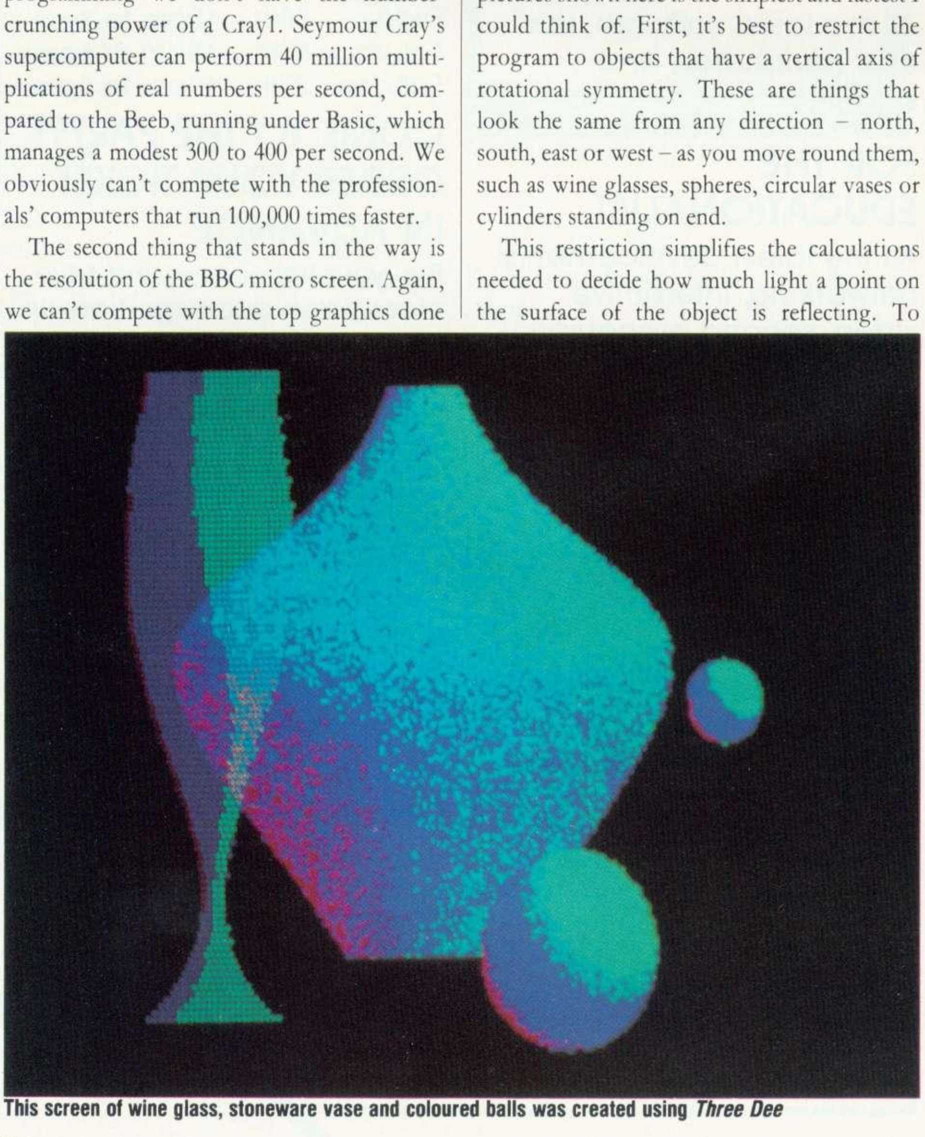
Is it possible to get images like this on the BBC micro or Electron? There are several reasons why you might think the answer is 'no'. First, 3D stuff is notorious for being mathematical, and even if we can cope with the programming we don't have the number-crunching power of a Cray1. Seymour Cray's supercomputer can perform 40 million multiplications of real numbers per second, compared to the Beeb, running under Basic, which manages a modest 300 to 400 per second. We obviously can't compete with the professionals' computers that run 100,000 times faster.

The second thing that stands in the way is the resolution of the BBC micro screen. Again, we can't compete with the top graphics done on mainframes, but we ought at least to be able to try. Since our resolution is lower, we have fewer pixels to deal with, and this is the main factor that makes 3D shading practicable.

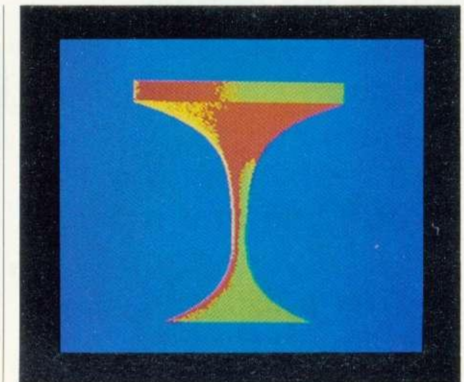
There are some things to be decided before plunging in, such as which mode to use. As the screen shots show, quite acceptable 3D effects can be produced using mode 1. Mode 1 has the advantage of four colours, and although shading using mode 0 is finer in resolution it tends to look a little tame in comparison.

There are several ways to work out the shading. The method used to produce the pictures shown here is the simplest and fastest I could think of. First, it's best to restrict the program to objects that have a vertical axis of rotational symmetry. These are things that look the same from any direction – north, south, east or west – as you move round them, such as wine glasses, spheres, circular vases or cylinders standing on end.

This restriction simplifies the calculations needed to decide how much light a point on the surface of the object is reflecting. To



This screen of wine glass, stoneware vase and coloured balls was created using *Three Dee*



Bubbly: uses a low value for scatter

calculate this, you need to know the angle at which light is striking it. More precisely, the brightness of the surface at that point is connected with the cosine of the angle between the direction the light is coming from and a line perpendicular to the surface, facing outwards. If the light is falling straight on the surface, at right angles to it, the angle will be 0 degrees. The cosine of this is 1. If the light is just grazing the surface, like the sun's rays at daybreak, the angle is 90 degrees and the cosine is zero. If the surface is facing directly away from the light source, the angle is 180 degrees, and the cosine is -1

Three Dee program

The program *Three Dee* (listing 1) on the yellow pages works out the cosine of the angle between the normal to the surface and the light direction. The light is assumed to be coming from above the object, from in front (the side you are viewing from) and from the right of the viewer. The precise direction of the light is 45 degrees above the horizontal from the southeast, if the direction you are looking is exactly north and horizontal.

Having found the cosine, a very simple rule is used to decide what colour to plot the pixel at that point. The program just adds the cosine value (which is between -1 and 1) to 2.5, and uses the result as the logical number of the colour to plot. The answer will obviously come out between 1.5 and 3.5. The GCOL command will use colour 1 if the answer is less than 2, colour 3 if it is more than 3, and colour

2 otherwise. Add in a bit of random factor if you wish, and you'll get the kind of shading shown in the screenshots.

By using this simple algorithm or calculation rule to decide what colour to plot each point, it's possible to give the effect of an object lit only from one side, or from two sides by different lights. The image of the red planet is lit from one side, while the third 'goblet' image is lit from two.

Running the program

When running *Three Dee*, select option 1 'create screen' at first, until you have built some images and saved them. On selecting 'create', you are asked for values for several parameters that govern how the image is drawn. First is 'fineness' which is the resolution required. Entering 1 will give maximum pixel density, but is best reserved for the final drawing of an object when you know you have everything else right, as it's quite slow – level 2 or 4 is better for trying out ideas. A fineness of 8 is fast but crude.



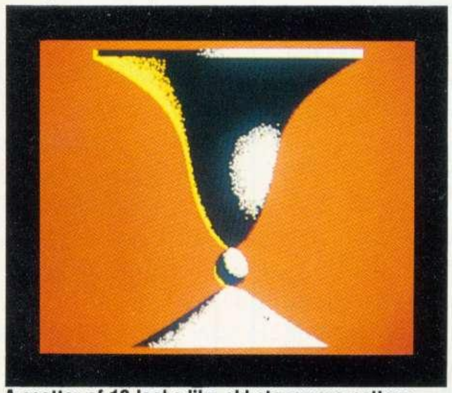
This goblet was achieved with a scatter of 0

Next comes scatter – the amount of randomness you wish to introduce into the shading. The effects of different amounts of scatter can be seen in the three 'goblet' images. Scatter of 0 gives a hard, shiny appearance like polished metal in sunlight, quite striking but less realistic looking than a scatter of 2 to 5. A scatter of 10 gives an appearance like old stoneware pottery in weak, diffuse lighting. This can be very effective with a black background. If in doubt, choose a medium value of scatter.

The next input is called scaling. For an image that fills the screen from top to bottom choose 100, while 10 will draw the same object but much smaller. A good technique is to use 40 or 50 when playing about discovering shapes, and 80 or 90 for final production runs with fineness of 1. This speeds up the development work.

You are now asked to input two numbers called X shift and Y shift. These values will cause the image to be displaced sideways (X) and vertically (Y). If both are zero (enter no value, just press Return) the image will be in the centre of the screen. X shift of 125 moves the centre of the object to the right-hand edge of the screen, while -125 moves it to the left edge. Y shift moves the image up or down. These shift values are really only useful for overlaying images, explained below. At first, enter nothing for either shift.

Having entered these parameters, you get a new menu that enables you to specify what shape will be drawn. You have to give the computer an equation to work with – this is a



A scatter of 10 looks like old stoneware pottery

relationship between R, the radius of the object, and Y, the height above or below the centre of the object. This may sound rather mathematical, but a few simple principles will enable even a mathematical novice to get interesting shapes by trial and error. Most of the images shown here were discovered by happy chance as I attempted to get from the red planet image to the champagne glass shape!

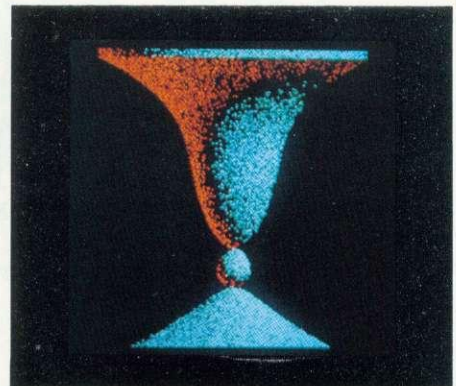
Choose a shape

First you must choose from three fundamental types of equation. Choosing 'R a function of Y' is the way to straightforward, elegant shapes like vases and glasses. R-squared gives somewhat rougher shapes; it is the only way to get a sphere, or certain S-bends. R-inverse is an extra option, in case you can't get what you want with either of the others.

If you know exactly the shape you want, you may be able to work out the equation for it. The horizontal cross section must always be circular, of course. The vertical cross section gives the equation required. For instance, a sphere has a vertical cross section that is also a circle, with the equation R^2+Y^2=1.

This equation involves R squared (R^2), so you choose option 2 on the menu. The computer now invites you to construct the equation on the screen, term by term. Rearrange your equation so the R^2 (or R or 1/R) is on the left, and everything else on the right. For the sphere, you get R^2=1−Y^2 or R^2=1.0−0Y^2.

This is an equation with a constant term of



It's best to experiment from a medium scatter value

1.0. Type this number in after the prompt 'R^2='. Don't put the −1.0Y^2 in yet.

The computer then asks if there is a Y term, by printing '+Y ×'. There is no Y term, so enter zero (just press Return). The computer asks for the Y^2 term, which for the sphere is −1.0. Enter this number. Input nothing for the Y^3 and Y^4 terms.

The final position if you are drawing a sphere should look like this:

```
R*R =      1.0
   +Y×
   +Y^2×  −1.0
   +Y^3 ×
   +Y^4 ×
```

The program finally asks you for the name of a 'preload file'. This is used for creating overlaid images. For now, enter nothing, press Return.

If you did everything right, the sphere should appear. It is drawn in three colours, which initially are red, blue, and cyan (you can change them afterwards). Notice the way that

Name	Equation
Red planet	R^2=1.0−1.0Y^2
Goblet	R=0.08+0.18Y−0.18Y+0.18Y^3+1.0Y^4
Magic urn	R^2=1.0+0.7Y−1.0Y^2−0.7Y^3−0.2Y^4
Bubbly	R=0.08+0.12Y+0.24Y^2+0.48Y^3+0.96Y^4
Wine glass	R=0.22+0.3Y−0.3Y^2−0.3Y^3+0.3Y^4
Stone vase	1/R=1.0+2Y^2+2Y^3+2Y^4

Table 1. The equations to reproduce the screenshots

the object seems to be lit from above and in front by a cyan light and from behind and below by a red light.

Change the lighting

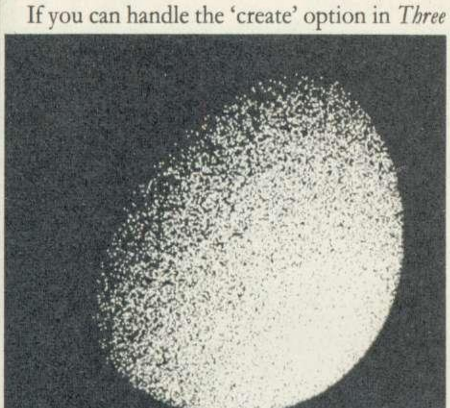
Once the image has been drawn you can change the colours used by pressing one of the function keys f0 to f3. Pressing f0 alters the background colour, rotating it one colour at a time through the eight non-flashing colours.

Pressing f1 changes the first of the three colours used in shading the object, known as the 'back light'. This is the one initially set to red. Hitting f2 changes the third colour, the 'front light' that is cyan at first, while f1 alters the middle colour, called the 'ambient light', which starts off blue.

Almost any combination of front and back light gives an interesting appearance. On the other hand, the ambient light (f2) should be dark (black is best) if you want a convincing 3D effect. Having the ambient light a bright gaudy colour gives a quite different appearance. The champagne glass 'bubbly' image is done like this, with low scatter. The 'magic urn' is accomplished with high scatter.

When you have finished with an image, you can press S to save it, or C to cancel it and continue. A saved screen is always saved under the name 'SCREEN', so if you want to save several you have to escape from the program and change the names of each one as you go. Note that each screen occupies just over 10k.

If you can handle the 'create' option in *Three*



The red planet is an image lit from one side only

Dee for drawing spheres you will want to try devising other shapes. A few guiding principles may help. Y runs from −1 at the bottom of the object to +1 at the top. R should also not be allowed to go below −1 or above +1, unless you want to make use of the 'vertical edge' effect (as in the magic urn and goblets.)

To make sure R keeps between −1 and 1, select the 'R a function of Y' option at first, and only type in coefficients between −1 and 1. This does not guarantee R will stay within bounds, but it helps. If you get an image that is just a large squat cylinder, R is out of bounds all the way from Y = −1 to Y = +1!

The same rule applies to the 'R-squared' type functions. These give similar shapes to the 'R' option, but rounder. On the other hand, the 'R−inverse' option also inverts the rule: you are aiming to keep 1/R bigger than 1 (or below −1) so type in coefficients larger than 1 – say up to 5 and down to −5.

A few more hints. For images that are mirror symmetric across their own centre-line

Name	Red planet	Goblet	Magic urn	Bubbly	Wine glass	Stone vase
Fineness	1	1	1	1	2	1
Scatter	10	10	9	2	0	10
Scale	90	90	90	90	70	50
X Shift	<ret>	<ret>	<ret>	<ret>	<ret>	<ret>
Y Shift	<ret>	<ret>	<ret>	<ret>	<ret>	<ret>
Choice	2	1	2	1	1	3
<var>	1.0	0.08	1.0	0.08	0.22	1.0
+Y*	<ret>	0.18	0.7	0.12	0.3	<ret>
+Y^2*	−1.0	−0.18	−1.0	0.24	−0.3	2
+Y^3*	<ret>	0.18	−0.7	0.48	−0.3	2
+Y^4*	<ret>	1.0	−0.2	0.96	0.3	2
Preload	<ret>	<ret>	<ret>	<ret>	<ret>	<ret>

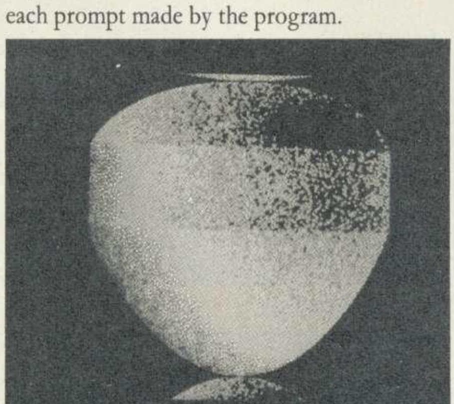
Key: <ret> return key; <var> display is variable depending on option selected, 1 will give R as a function of Y, 2 will give R^2, 3 will give 1/R

Table 2. The keystrokes to be entered to create the images on these pages

(Y = 0), the coefficients of Y and of Y^3 must be zero. The more of these two coefficients you add in, the bigger the difference will be above and below the centre-line. To get a shape that comes to a point (zero radius) at the very top, the five coefficients must add up to zero.

Recreating the screenshots

These principles should enable you to create some original shapes. If you want to reproduce the screenshots in this issue than tables 1 and 2 give the necessary details. Table 1 presents the information in equation form, while table 2 shows it in terms of the keystrokes you should enter. So if you just want to display the shots on your screen, simply select the 'create' option on running the program and enter the keystrokes in the order listed in response to each prompt made by the program.



Magic urn. Tables 1 and 2 show how to create it

Once having saved a SCREEN file, it's possible to load it in and look at it using the 'inspect' option in the first menu. The colours can still be changed using f0 to f3, and it can be resaved with new colours by pressing S. It is always saved with the name 'SCREEN'. Press C to continue without saving.

A file can be preloaded just before a new shape is drawn by entering the filename when asked for one under the 'create' option. This will draw the new shape (specified using the 'create' facilities) over the top of the preloaded screen. The scene of the wine glass, stoneware vase and coloured balls was created by these methods. The wine glass and spheres were displaced from the centre using the X shift and Y shift values. The sphere that overlaps the vase was done with fineness 1, but the wine glass had a scatter of 0 and fineness of 2 so that the vase it was drawn on top of would show through it. This makes it appear transparent, but hard and shiny. The vase was drawn first, then the other three objects, saving each screen

S	Save Screen to current filing system using filename 'SCREEN'
C	Continue with next image
f0	Change background colour
f1	Change back lighting
f2	Change front lighting
f3	Change top lighting

Table 3. Quick reference guide to what the keys do

as it was finished and preloading it again before the next object was drawn.

For the more ambitious, here is some help in changing the program in various ways. To use it in mode 2, change line 620 to read 'STEP A%*2'. For mode 0, ask it to 'STEP A%/2'. You will also need to change the colour controlling procedure PROCV if you want more than four colours.

Line 630 contains the randomising factor for the 'scatter' effect, if you want to play about with it. This line also controls the direction of lighting. Change X% to −X% to get lighting from the left, +V to −V from below.

If you do not like the way the shape turns into a cylinder for R bigger than 1 or below −1, remove lines 1060 and 1070. For special functions connecting R to Y, put your own function into line 1020, and remove lines 1040 and 1050. To make objects look hollow rather than convex when R goes negative, remove the 'ABS' from line 1030.

Peter Voke's listings are on yellow pages 119 to 120

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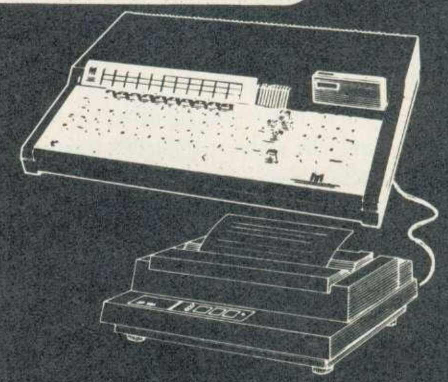
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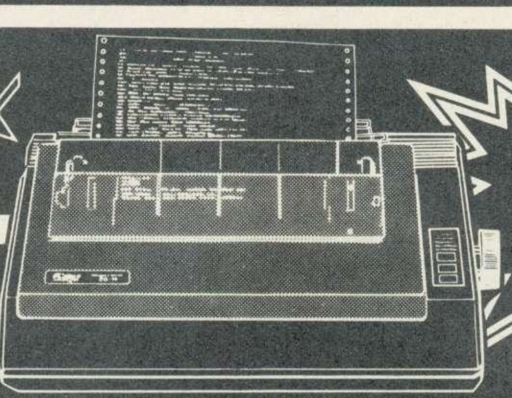
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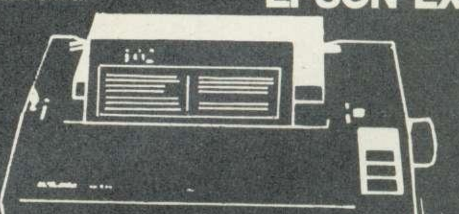
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The Great Music Competition gives you the chance to win a computer music system as used by chart-topping bands such as Ultravox, Tears For Fears, Blancmange and A-Ha. All we want you to do is to write a catchy original instrumental single which could climb to number one in the Top Ten pop charts.

And to enter you don't even need a computer, because we're looking for musical skills. Entries have to be submitted as recordings on a standard musical cassette, and when we judge the results we'll take into account the standard of equipment on the recording.

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- BBC Master 128 micro system with monochrome monitor and disc drive.
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What you do

First compose your tune – and it must be no longer than three minutes – and play it on whatever instruments, micro, etc you have. The next stage is to record it on a standard musical cassette.

Entries must be submitted as music on cassette – we cannot accept computer software of any kind.

Next, explain on just one sheet of paper what instruments, software, etc you used and how you would improve the music with better equipment. This information will be taken into account during the judging.

Then, fill in the entry form opposite, attach it to your sheet of paper and put them in an envelope with the cassette.

Finally, post it off to us. You *must* clip the entry form coupon from the magazine and there must only be one piece of music on the tape, and only one tape.

We regret that entries cannot be returned. The winners will be notified by post and their names printed in *Acorn User*.

Tips for your entry

- The first 30 seconds of music are the most important. The experts we have as judges will decide by then how good it is. Professional 'A&R' men in the music industry spend their whole day listening to hopeful chart hits and a single has to grab them in the first 15 seconds to stand a chance. So it is vital to think up a snappy, catchy fanfare-style intro.
- Make sure you record at the start of the cassette tape – the judges don't have time to listen to 10 minutes of silence before getting to the tune.
- Make the recording in the best possible conditions you can find.

Keep background noise to a minimum and experiment with special effects such as echoes in large empty rooms.

- Play the tape back to yourself to make sure the recording was successful and to check on the quality before sending it off.
- Wind the tape back to the beginning and mark which side it is recorded on.
- Put your name and address on everything you send in to us.

ILLUSTRATION BY MAC McINTOSH



F PRIZES AT STAKE

128, MI, Casio CZ101 – if you can compose an instrumental tune as catchy as a chart-topping hit

By all means get ideas from past instrumental hits like Elton John's 'Song for Guy', 'Albatross' from Fleetwood Mac, Kraftwerk's 'Autobahn' and the many TV themes such as that from *Howard's Way*. But we don't want copies of these you have to come up with something original.

Judges

A panel of people from *Acorn User* and the music industry will judge the entries.

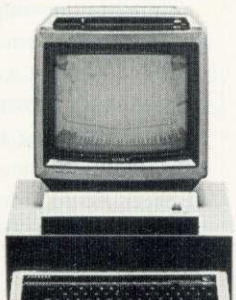
The judging panel will include Tony Quinn editor of *Acorn User*, Chris Cross from leading pop group Ultravox, Linton Naiff who designed the UMI, and Ed Jones from the London Rock Shop.

The decision of this panel will be final and no correspondence will be entered into about the competition or the result.

Please send us only your cassette, entry form and details of your recording – don't include any letters, programs or questions in the same envelope with them.

Entries must be received by Wednesday April 30 1986.

Send your entries to April Competition, at our new address which is Acorn User, Redwood Publishing, 142-143 Drury Lane, London WC2B 5TF.



Your entry with this coupon could win you a music system similar to this – featuring a Master 128 micro, disc drive, monitor, UMI-2B 16 channel sequencer and Casio CZ101 music synthesiser



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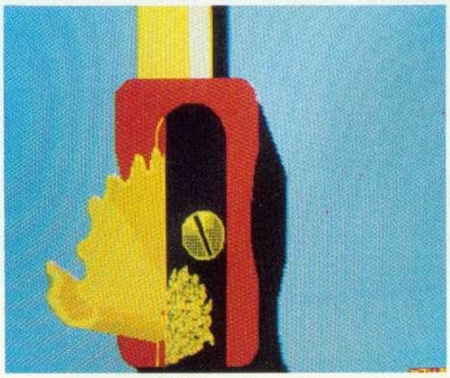
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Send this coupon, your music recorded on a standard cassette, and one sheet of paper outlining your equipment and improvements you would make if you had a professional set-up to: Acorn User, 142-143 Drury Lane, London WC2B 5TF. Entries must be received by April 30, 1986.

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Screens from past listings discs – the pencil sharpener and Wimp Fashions both appeared in March

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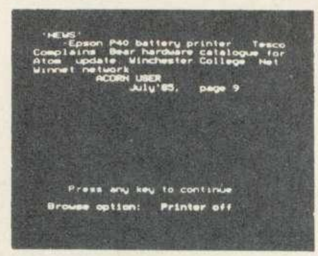
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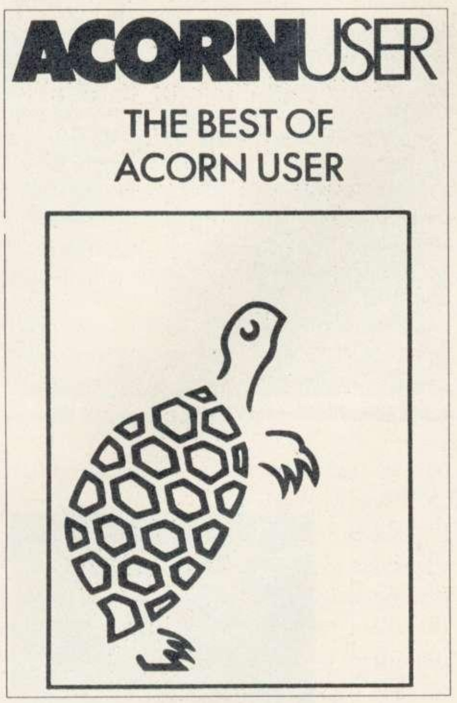
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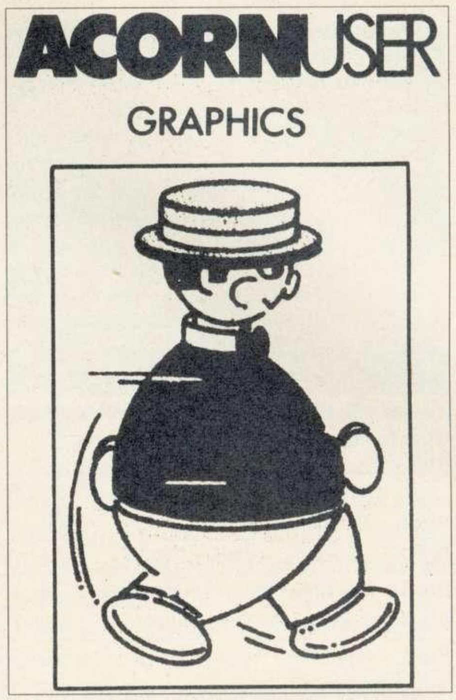
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These are the entertaining and ever popular *Graphics* cassette and the indispensable selection of programs from the magazine contained in the *Best of Acorn User*.

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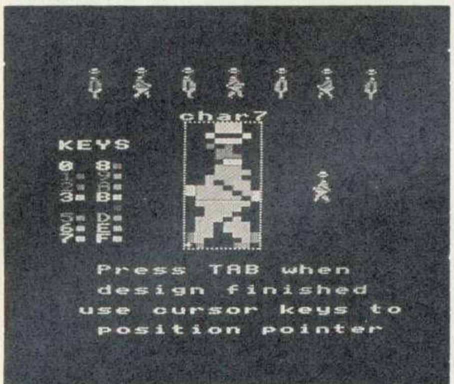
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The Graphics Cassette's sprite designer

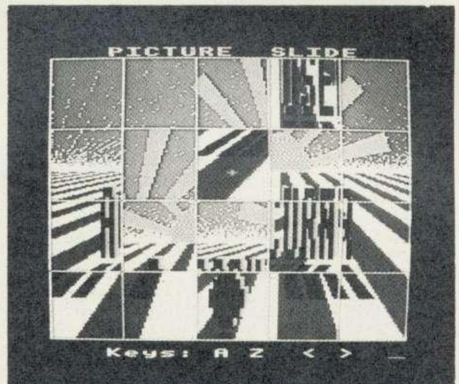
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox,* Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

Paintbox, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

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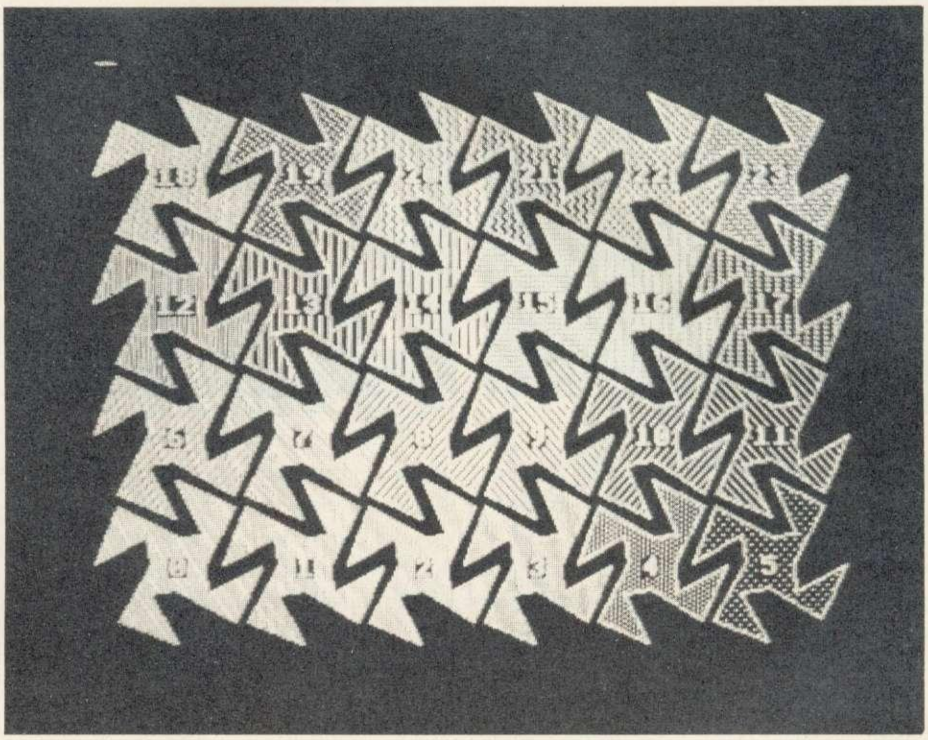
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USERROM

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Acorn User on a chip for £19.95



The *Acorn User UserROM* brings the best of *Acorn User* permanently into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite routines that have appeared in the pages of *Acorn User* over the past two years. Simply plug the ROM chip into a spare sideways ROM socket and all the routines are instantly accessible via easy to use * commands – what could be simpler!

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, a bulletin board, screen compressor, on screen character fonts, ROM lister, sound compiler, plus lots, lots more! Quite simply invaluable routines that the serious Acorn user cannot be without!

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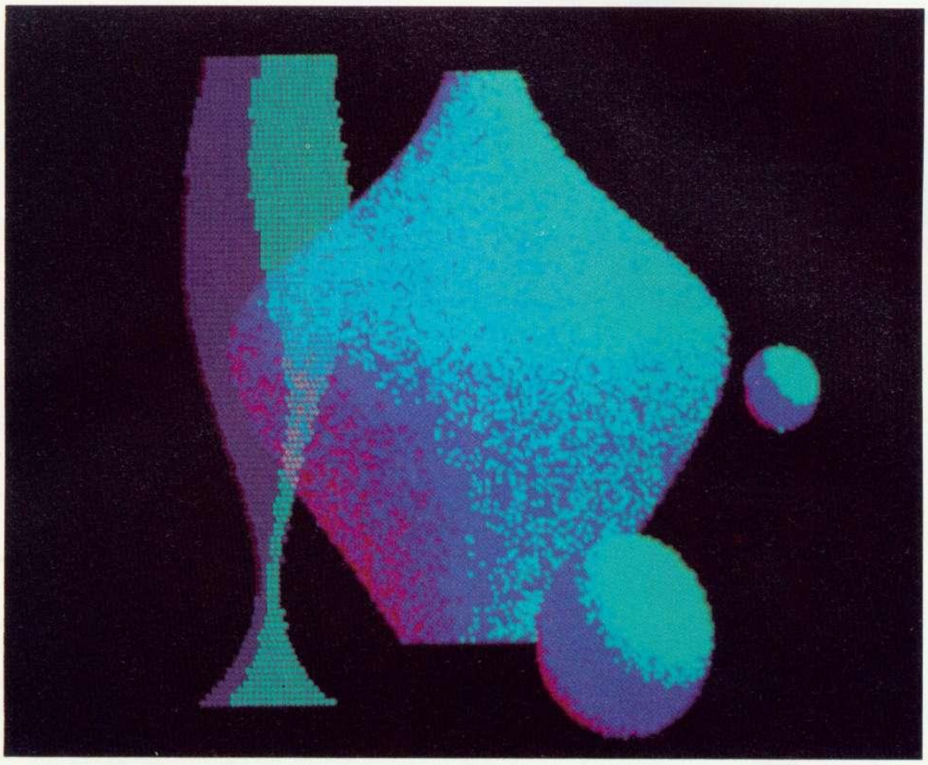
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YELLOW PAGES

HINTS & TIPS

INDEX

Program		Page	BBC B	BBC B+/ 128k	BBC ADFS	Shadow RAM	Electron	Electron with Plus 1	Electron with Plus 3 and Plus 1	Master 128	Master 128 with ADFS	6502SP	Econet	Monthly disc/ tape
Hints & Tips	Listing 1	105	●	●			●	●		●	●			●
	Listing 2	107	●	●	●	●		●	●	●	●	●	●	(a)●
	Listing 3	108	●	●	●	●		●	●	●	●	●	●	(a)●
First Byte		109	●	●	●	●	●	●	●	●	●		●	●
Basic Expansions														
	Listing 1	112	●	●	●	●			●	●	●			●
	Listing 2	112	●	●	●	●			●	●	●			●
	Listing 3	112	●	●	●	●			●	●	●	●	●	(b)●
	Listing 4	114	●	●	●	●			●	●	●	●	●	●
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	Listing 2	114	●	●	●	●				●	●		●	●
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	Listing 5	115	●	●	●	●				●	●		●	●
	Listing 6	116	●	●	●	●				●	●		●	●
	Listing 7	117	●	●	●	●				●	●		●	●
3 Dee		119	●	●	●	●	●	●	●	●	●	●	●	●

(a) Epson or Epson compatible printer required (b) BBC B, B+, and Electron: Sideways RAM required

Entering listings

Where possible, programs are listed with line numbers in increments of 10 so type AUTO <RETURN> for automatic line numbering before you start. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type:

LISTO 1<RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen modes 1,4,6 or 7, WIDTH 40 is not needed. Occasionally, for clarity, programs are listed with a text width different to 40 characters.

Typing errors in Basic will usually cause error messages when the program is run. Finding errors in assembly language listings can be harder so we provide small, checking routines (called 'checksums') where possible.

All the Yellow Pages listings will work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS1.2 or later operating systems.

Hints & Tips see page 49

Listing 1. Turtle Graphics doesn't work quite as you expect

```
   10 REM Hints & Tips - Listing 1
   20 REM Turtle Graphics
   30 REM by Malcolm Banthorpe
   40 REM abused by Martin Phillips
   50 REM B/B+/E/M
   60 REM (c) Acorn User April 1986
   70 :
   80 IF PAGE>&1300 PROCreloc
   90 MODE 1:PROCinit
  100 REPEAT F%=0:W$(2)=""
  110 PROCw1:PRINTt$:PROCw2
  120 INPUTTAB(0,4)A$
  130 IF A$="" THEN wally=(wally+1) MOD2
:Z%=0:GOTO120
  140 A$=FNlower(A$)
  150 PROCw1:CLS:PROCw2
  160 UNTIL FNinterpret(A$)=FALSE
  170 MODE 7
  180 END
  190 :
  200 DEF FNinterpret(A$)
  210 xpos=X:ypos=Y:angle=A%
  220 LOCAL P%,I%,N%:P%=C%:LOCAL C%
```

Continued ▶

◀ Continued

```
  230 IF FNwords(A$)=0 =TRUE
  240 IF W$(1)="end" =TRUE
  250 IF W$(1)="again" =TRUE
  260 E1%=TRUE
  270 FOR I%=1 TO VALC$(0)
  280 A$=C$(I%)
  290 IF RIGHT$(W$(1),1)="." A$=LEFT$(A$
,LENW$(1)-1)+"."
  300 IF W$(1)=A$ C%=I%:C$=C$(I%):I%=VAL
C$(0)
  310 NEXT
  320 IF C%=0 PRINTTAB(0,4)"Not defined"
:=TRUE
  330 E1%=FALSE
  340 D%=VAL(W$(2))
  350 IF C%<22 =EVAL("FN"+C$)
  360 F%=1:REPEAT
  370 D%=FNinterpret(C$(C%+1)):C%=C%+1
  380 UNTIL C$(C%)="end":=TRUE
  390 :
  400 DEF FNclear
  410 IF Z%<25 THEN GOTO 480
  420 VDU 5,29,0;0;:FOR N=1 TO 1000
  430 x=RND(1280)
```

Continued ▶

Hints & Tips listing 1 continued

```
 440 y=192+RND(864):GCOLO,RND(3)
 450 MOVE x,y:PRINTt$
 460 NEXT:VDU 4,29,640;592;
 470 Z%=0:=TRUE
 480 CLG:MOVE 0,0:A%=0:X=0:Y=0:S=0:C=1
 490 scale=1:PROCup:=TRUE
 500 :
 510 DEF FNright:PROCpoint
 520 A%=A%+EVALW$(2)+FNwally(EVALW$(2))
 530 S=SINRADA%:C=COSRADA%
 540 PROCup:=TRUE
 550 :
 560 DEF FNleft:PROCpoint
 570 A%=A%-EVALW$(2)-FNwally(EVALW$(2))
 580 S=SINRADA%:C=COSRADA%
 590 PROCup:=TRUE
 600 :
 610 DEF FNthinlines:FL%=FALSE:=TRUE
 620 DEF FNfatlines:FL%=TRUE:W%=2*EVALW
$(2):=TRUE
 630 DEF FNoutline:OL%=D%:=TRUE
 640 DEF FNpenup:K%=0:=TRUE
 650 DEF FNpendown:K%=1:=TRUE
 660 DEF PROCline2:PLOT K%+4,X,Y:ENDPRO
C
 670 DEF FNscale:scale=scale*EVALW$(2):
=TRUE
 680 DEF FNsetscale:scale=EVALW$(2):=TR
UE
 690 DEF PROCw1:VDU 28,2,31,5,29:ENDPRO
C
 700 DEF PROCw2:VDU 28,6,31,27,27:ENDPR
OC
 710 :
 720 DEF FNforward
 730 PROCpoint
 740 LX=X:LY=Y:D%=EVAL(W$(2))+10*FNwall
y(D%)
 750 X=X+D%*S*scale+1E-5
 760 Y=Y+D%*C*scale+1E-5
 770 IF (FL% AND K%) PROCline1 ELSE PRO
Cline2
 780 PROCup:=TRUE
 790 :
 800 DEF PROCline1
 810 x=W%*C:y=W%*S
 820 MOVE LX-x,LY+y:MOVE LX+x,LY-y
 830 PLOT 84+K%,X-x,Y+y
 840 PLOT 84+K%,X+x,Y-y
 850 IF OL%>0 PROCoutline
 860 ENDPROC
 870 :
 880 DEF PROCoutline
 890 GCOL 0,OL%:IF Z%>25 THEN GCOLO,RND
(3)
 900 MOVE LX-x,LY+y:DRAW X-x,Y+y
 910 MOVE LX+x,LY-y:DRAW X+x,Y-y
 920 ENDPROC
 930 :
 940 DEF FNmove
 950 PROCpoint
 960 X=D%+FNwally(D%)
 970 Y=VALW$(3)+FNwally(VALW$(3))
 980 MOVE X,Y
 990 PROCup:=TRUE
1000 :
1010 DEF FNpencolour
1020 IF Z%>25 THEN D%=RND(16)
1030 GCOL 0,D%:c%=D%:=TRUE
1040 :
```

Continued ▶

◀ Continued

```
1050 DEF FNsetcolour
1060 IF Z%>25 THEN W$(3)=STR$(RND(16))
1070 VDU 19,VALW$(2),EVALW$(3);0;
1080 =TRUE
1090 :
1100 DEF FNquit:IF Z%>25 AND RND(1)>0.6
=TRUE
1110 =FALSE
1120 :
1130 DEF FNto:LOCAL J%
1140 IF W$(2)="" PRINTCHR$7"TO WHAT?":=
TRUE
1150 E%=FALSE:FOR J%=22 TO VALC$(0)
1160 IF W$(2)=C$(J%) E%=TRUE:J%=VALC$(0
)
1170 NEXT
1180 IF E% PRINTCHR$(7)W$(2)" ALREADY D
EFINED":=TRUE
1190 COLOUR 1:PROCw1:PRINTt$:PROCw2
1200 Q%=VALC$(0):J%=Q%+1:C$(J%)=W$(2)
1210 REPEAT J%=J%+1
1220 PROCw1:PRINTt$:PROCw2
1230 INPUTTAB(0,4)A$
1240 PROCw1:CLS:PROCw2
1250 C$(J%)=FNlower(A$)
1260 D%=FNinterpret(C$(J%))
1270 IF E1%=TRUE J%=J%-1
1280 UNTIL C$(J%)="end"
1290 COLOUR 0
1300 C$(0)=STR$J%:=TRUE
1310 :
1320 DEF FNrepeat
1330 IF F%=0 =TRUE
1340 LOCAL T%,J%,R%:R%=P%
1350 FOR J%=1 TO VAL W$(2)-1
1360 T%=R%+2
1370 REPEAT
1380 D%=FNinterpret(C$(T%)):T%=T%+1
1390 UNTIL C$(T%)="again" OR C$(T%)="en
d"
1400 NEXT
1410 C%=T%+1:=TRUE
1420 :
1430 DEF FNlist:LOCAL T%,I%
1440 IF W$(2)="" =TRUE
1450 IF C$(0)="21" =TRUE
1460 FOR I%=22 TO VALC$(0)
1470 IF W$(2)=C$(I%) T%=I%:I%=VALC$(0)
1480 NEXT
1490 IF T%=0 PRINTTAB(0,4)"Not defined"
:=TRUE
1500 VDU 28,1,25,20,1,30
1510 COLOUR 3:COLOUR 128
1520 PRINT"to "W$(2)'
1530 REPEAT T%=T%+1
1540 PRINTC$(T%)
1550 UNTIL C$(T%)="end"
1560 COLOUR 0:COLOUR 131
1570 =TRUE
1580 :
1590 DEF FNforget LOCAL T%,T1%,I%
1600 IF W$(2)="" =TRUE
1610 FOR I%=22 TO VALC$(0)
1620 IF W$(2)=C$(I%) T%=I%:I%=VALC$(0)
1630 NEXT:IF T%=0 =TRUE
1640 T1%=T%
1650 REPEAT T%=T%+1
1660 UNTIL C$(T%)="end"
1670 FOR I%=0 TO VALC$(0)-T%-1
1680 C$(T1%+I%)=C$(T%+I%+1)
```

Continued ▶

Listing 1 continued

```
1690 NEXT
1700 C$(0)=STR$(VALC$(0)+T1%-T%-1)
1710 =TRUE
1720 :
1730 DEF FNtrail(A$)
1740 IF RIGHT$(A$,1)<>" " =A$
1750 =FNtrail(LEFT$(A$,LENA$-1))
1760 :
1770 DEF FNsave
1780 F=OPENOUT(W$(2))
1790 PRINT#F,C$(0)
1800 FOR I%=22 TO VALC$(0)
1810 PRINT#F,C$(I%)
1820 NEXT:CLOSE#F:=TRUE
1830 :
1840 DEF FNload
1850 F=OPENIN(W$(2))
1860 INPUT#F,C$(0)
1870 FOR I%=22 TO VALC$(0)
1880 INPUT#F,C$(I%)
1890 NEXT:CLOSE#F:=TRUE
1900 :
1910 DEF FNlead(A$)
1920 IF LEFT$(A$,1)<>" " =A$
1930 =FNlead(RIGHT$(A$,LENA$-1))
1940 :
1950 DEF FNwords(A$) LOCAL I%
1960 IF LENA$=0 =0
1970 A$=FNlead(A$)
1980 N%=N%+1:I%=INSTR(A$," ")
1990 IF I%=0 W$(N%)=A$:=N%
2000 W$(N%)=LEFT$(A$,I%-1)
2010 =FNwords(RIGHT$(A$,LENA$-I%))
2020 :
2030 DEF FNlower(A$) LOCAL B$,T$,T%
2040 FOR I%=1 TO LENA$
2050 T$=MID$(A$,I%,1):T%=ASCT$
2060 IF T%<97 AND T%>64 T$=CHR$(T%+32)
2070 B$=B$+T$:NEXT
2080 =B$
2090 :
2100 DEF PROCpoint LOCAL A%,B%,C%,D%
2110 IF Z%>25 AND RND(1)>0.97 THEN VDU
5:GCOL 4,3:x=X:REPEAT:MOVE x,Y:PRINTt$;:
I=INKEY(10):MOVE x,Y:PRINTt$;:x=x+32:UNT
IL x>570:VDU 4
2120 GCOL 3,3:MOVE X,Y
2130 A%=24*C:B%=32*S:C%=24*S:D%=32*C
2140 PLOT 0,-A%,C%:PLOT 1,A%+B%,-C%+D%
2150 PLOT 65,0,0:PLOT 1,A%-B%,-C%-D%
2160 MOVE X,Y:GCOL 0,c%
2170 ENDPROC
2180 :
2190 DEF PROCup
2200 PROCpoint:IF wally=0 THEN Z%=Z%+1:
IF Z%>25 AND RND(100)>33 THEN Z%=20
2210 ENDPROC
2220 :
2230 DEF PROCinit
2240 COLOUR 0:COLOUR131
2250 K%=1:A%=0:c%=3:W%=0:OL%=0:Z%=0
2260 FL%=FALSE:E1%=FALSE:wally=0
2270 S=0:C=1:X=0:Y=0:scale=1
2280 red=1:green=2:yellow=3
2290 blue=4:magenta=5
2300 cyan=6:white=7:black=0
2310 FOR C%=224 TO 227:VDU 23,C%
2320 FOR B%=1 TO 8
2330 READ N%:VDU N%
2340 NEXT:NEXT
```

Continued ▶

◀ Continued

```
2350 t$=CHR$224+CHR$225+CHR$226+CHR$10+
STRING$(3,CHR$8)+CHR$227+CHR$227
2360 VDU 24,8;164;1271;1015;29,640;592;
2370 VDU 19,2,4,0,0,0,12,16
2380 VDU 28,8,31,27,27:CLS
2390 DIM W$(3),C$(100)
2400 FOR I%=1 TO 21:READC$(I%):NEXT
2410 C$(0)="21":PROCup
2420 ON ERROR IF ERR=17 C$(0)="21":GOTO
100 ELSE REPORT:PRINT" at ";ERL:GOTO 10
0
2430 ENDPROC
2440 :
2450 DATA 0,0,63,106,209,255,146,127
2460 DATA 0,0,248,44,70,255,73,255
2470 DATA 0,0,0,0,60,118,252,248
2480 DATA 6,124,248,0,0,0,0,0
2490 :
2500 DATA clear,penup,pendown,right
2510 DATA left,forward,move,pencolour
2520 DATA quit,to,repeat,scale,save
2530 DATA load,list,setcolour
2540 DATA fatlines,thinlines
2550 DATA outline,setscale,forget
2560 :
2570 DEF PROCreloc:*FX3,14
2580 *KEY1 FORX%=OTO(TOP-PAGE)STEP4:X%!
&1300=X%!PAGE:N.:PA.=&1300:O.|M *FX3|M R
UN|M
2590 *FX 138,0,129
2600 END
2610 :
2620 DEF FNwally(V%)
2630 IF Z%<25 THEN =0
2640 s=RND(100):IF s>50 THEN s=1 ELSE s
=-1
2650 x=V%*RND(1)/50
2660 =x+s
```

Listing 2. Manipulates the bit pattern for a dot-matrix printer

```
 10 REM Hints & Tips - Listing 2
 20 REM Epson bit image from
 30 REM VDU 23 definitions
 40 REM by Jim Walsh
 50 REM B/B+/M/E with Plus 1
 60 REM (c) Acorn User April 1986
 70 :
 80 MODE 1
 90 PROCdefine
100 PROCmc
110 VDU 2
120 PRINT"Heart    ";
130 PROCprint(128):PRINT'
140 PRINT"Spade    ";
150 PROCprint(129):PRINT'
160 PRINT"Club     ";
170 PROCprint(130):PRINT'
180 PRINT"Diamond  ";
190 PROCprint(131):PRINT'
200 VDU 3
210 END
220 :
230 DEF PROCdefine
240 VDU 23,128,108,254,254,254,124,56,
16,0
```

Continued ▶

Hints & Tips listing 2 continued

```
250 VDU 23,129,16,56,124,254,254,254,5
6,124
260 VDU 23,130,16,56,56,214,254,214,16
,56
270 VDU 23,131,16,56,124,254,124,56,16
,0
280 ENDPROC
290 :
300 DEF PROCmc
310 DIM printer 120
320 oswrch=&FFEE
330 osword=&FFF1
340 FOR pass=0 TO 2 STEP 2
350 P%=printer
360 [OPT pass
370 LDX #&70
380 LDY #0
390 LDA #10
400 JSR osword
410 .print
420 LDX #0
430 .loop
440 ASL &71
450 ROL A
460 ASL &72
470 ROL A
480 ASL &73
490 ROL A
500 ASL &74
510 ROL A
520 ASL &75
530 ROL A
540 ASL &76
550 ROL A
560 ASL &77
570 ROL A
580 ASL &78
590 ROL A
600 STA &79,X
610 INX
620 CPX #8
630 BNE loop
640 LDA #1
650 JSR oswrch
660 LDA #27
670 JSR oswrch
680 LDA #1
690 JSR oswrch
700 LDA #75
710 JSR oswrch
720 LDA #1
730 JSR oswrch
740 LDA #8
750 JSR oswrch
760 LDA #1
770 JSR oswrch
780 LDA #0
790 JSR oswrch
800 LDX #0
810 .loop1
820 LDA #1
830 JSR oswrch
840 LDA &79,X
850 JSR oswrch
860 INX
870 CPX #8
880 BNE loop1
890 RTS
900 ]NEXT
910 ENDPROC
```

Continued ▶

◀ Continued

```
920 :
930 DEF PROCprint(Z%)
940 ?&70=Z%
950 CALL printer
960 PRINTCHR$(Z%);
970 ENDPROC
```

Listing 3. Produces a bit image for ASCII characters above 127

```
10 REM Hints & Tips - Listing 3
20 REM Epson bit image from
30 REM VDU 23 definitions
40 REM by F L Menting
50 REM B/B+/M/E with Plus 1
60 REM (c) Acorn User April 1986
70 :
80 MODE 1
90 PROCdefine
100 PROCmc
110 VDU 2
120 $string="Heart    "+CHR$(128)
130 CALL print
140 $string="Spade    "+CHR$(129)
150 CALL print
160 $string="Club     "+CHR$(130)
170 CALL print
180 $string="Diamond "+CHR$(131)
190 CALL print
200 VDU 3
210 END
220 :
230 DEF PROCdefine
240 VDU 23,128,108,254,254,254,124,56,
16,0
250 VDU 23,129,16,56,124,254,254,254,5
6,124
260 VDU 23,130,16,56,56,214,254,214,16
,56
270 VDU 23,131,16,56,124,254,124,56,16
,0
280 ENDPROC
290 :
300 DEF PROCmc
310 oswrch=&FFEE
320 osword=&FFF1
330 osnewl=&FFE7
340 DIM mc 150, string 256,x 1
350 FOR pass=0 TO 2 STEP 2
360 P%=&70
370 [OPT pass
380 \ Reserve space for osword
390 .hlp
400 BRK:BRK:BRK
401 BRK:BRK:BRK
430 BRK:BRK:BRK
450 \ Reserve space for character
460 \ definitions
470 .code
480 BRK:BRK:BRK
481 BRK:BRK:BRK
510 BRK:BRK:BRK
511 BRK:BRK:BRK
540 ]
550 P%=mc
560 [OPT pass
570 .print
580 LDX #&FF
```

Continued ▶

Listing 3 continued

```
590 STX x
600 .printloop
610 INC x
620 LDX x
630 LDA string,X
640 BEQ printloop
650 CMP #13
660 BEQ done
670 CMP #128
680 BCS printuserdef
690 JSR oswrch
700 BNE printloop
710 :
720 .printuserdef
730 \ print character to screen
740 STA hlp
750 LDA #3
760 JSR oswrch
770 LDA hlp
780 JSR oswrch
790 LDA #2
800 JSR oswrch
810 JSR userdef
820 JMP printloop
830 :
840 .done
850 JSR osnewl
860 RTS
870 :
880 .getdefinition
890 LDA #10
900 LDX #hlp
910 LDY #0
920 JMP osword
930 :
940 .shiftdefinition
950 JSR bitimage
960 LDY #4
970 .shiftrow
980 LDA #0
990 LDX #8
1000 .shiftcolumn
1010 ROL hlp,X
1020 ROR A
1030 DEX
1040 BNE shiftcolumn
1050 STA code,Y
1060 INY
1070 CPY #11
1080 BCC shiftrow
1090 RTS
1100 :
1110 \ send 27,75,8,0 to printer
1120 .bitimage
1130 LDA #27
1140 STA code
1150 LDA #75
1160 STA code+1
1170 LDA #8
1180 STA code+2
1190 LDA #0
1200 STA code+3
1210 RTS
1220 :
1230 .send
1240 LDA #1
1250 JSR oswrch
1260 LDA code,X
1270 JSR oswrch
1280 INX
```

Continued ▶

◀ Continued

```
1290 DEY
1300 BNE send
1310 RTS
1320 :
1330 .userdef
1340 JSR getdefinition
1350 JSR shiftdefinition
1360 LDY #12
1370 LDX #0
1380 JSR send
1390 RTS
1400 ]NEXT
1410 ENDPROC
```

How to enter Programmer's Aid

As the listing is to help you in your future error checking you must take special care to enter the program correctly! As soon as you have typed it in save it! The program does contain its own checking routine and will advise you if an error occurs and where it is. Once you can run the program with no errors being reported you can save the final version to tape or disc. Remember to make any changes that you require, to the program after you have run it and ensured it is correct. Changes will result in checksum errors otherwise.

The program is in three sections so you can omit any sections not required. Simply delete the relevant lines. For example:

Utility	**keys affected*	*Delete lines*
Error lister	*0 and 1*	*290, 460 to 1310*
Variable lister	*2*	*300, 1340 to 2000*
Program recovery	*3*	*310, 2020 to 2600*

IMPORTANT: Note that a checksum value will be different for Master owners. You should change the 18145 in line 1310 to 18261.

Listing 1. Programmer's Aid

```
10 REM Programmers Aid
20 REM by Tessie Revivis
30 REM B/B+/E/M
40 REM (c) Acorn User April 1986
50 :
60 MODE 6
70 HIMEM=&5E00
80 :
90 REPEAT
100 CLS
110 PRINT"Programmers Aid"'
120 REPEAT
130 PRINT"Input work file name :";
140 INPUT""$(HIMEM+&1F0)
150 UNTIL LEN($(HIMEM+&1F0))=6
160 $(HIMEM+&1F0)=$(HIMEM+&1F0)+"1"
170 PRINT"Start file will be :";
180 PRINT$(HIMEM+&1F0)
190 PRINT"Is this okay? (Y/N)"''
200 A%=GET
210 UNTIL A%=89 OR A%=121
220 asc=&70:vec=&71
230 stack=&73:temp=&74
240 :
250 osasci=&FFE3
260 oswrch=&FFEE
270 osnewl=&FFE7
```

Continued ▶

	CTRL	SHIFT
Error extension on		
Error extension off		
List all variables		
Recover bad program		
Trace on		
Trace off		
Save latest version		
LIST01 WIDTH40		
*CAT		
*CAT2		

Figure 1. Function key strip for use with *Programmer's Aid* (listing 1)

Revivis listing 1 continued

```
 280 :
 290 PROCerror(&5E00)
 300 PROCvars(&5EB0)
 310 PROCprogram(&5F20)
 320 :
 330 *KEY0 CALL &5E00|M
 340 *KEY1 CALL &5E24|M
 350 *KEY2 CALL &5EB0|M
 360 *KEY3 CALL &5F20|M
 370 *KEY4 TRACE ON|M
 380 *KEY5 TRACE OFF|M
 390 *KEY6 SAVE $(HIMEM+&1F0)|M?(HIMEM+&1F6)=?(HIMEM+&1F6)+1|M
 400 *KEY7 LIST01|MWIDTH40|M
 410 *KEY8 *CAT|M
 420 *KEY9 *CAT 2|M
 430 *KEY10 OLD|MLIST|M
 440 END
 450 :
 460 DEF PROCerror(addr%)
 480 brkv=?&202+(?&203*256)
 490 P%=addr%
 500 [OPT pass
 510 .setup
 520 LDX #0
 530 .nextchr
 540 LDA message,X
 550 JSR osasci
 560 INX
 570 CMP #13
 580 BNE nextchr
 590 LDA &202
 600 STA address
 610 LDA &203
 620 STA address+1
 630 LDA #entry MOD 256
 640 STA &202
 650 LDA #entry DIV 256
 660 STA &203
 670 RTS
 680 :
 690 .restore
 700 LDX #0
 710 .nextchr
 720 LDA message2,X
 730 JSR osasci
 740 INX
 750 CMP #13
 760 BNE nextchr
 770 LDA address
 780 STA &202
 790 LDA address+1
 800 STA &203
 810 RTS
 820 :
 830 .entry
 840 BIT &FF
 850 BMI wasesc
 860 CLC
 870 LDA &1B
 880 ADC &39
 890 TAX
 900 LDY #0
 910 JSR osnewl
 920 .nexterror
 930 LDA (&19),Y
 940 CPY #0
 950 BEQ skipfirst
```

Continued ▶

◀ Continued

```
 960 CMP #13
 970 BEQ wasesc
 980 CMP #58
 990 BEQ wasesc
1000 .skipfirst
1010 CMP #32
1020 BCC garbage
1030 CMP #&80
1040 BCS garbage
1050 JSR oswrch
1060 .garbage
1070 INY
1080 DEX
1090 BNE nexterror
1100 DEY
1110 INC &19
1120 BNE nexterror
1130 INC &20
1140 BNE nexterror
1150 :
1160 .wasesc
1170 JMP brkv
1180 :
1190 .message
1200 OPT FNequs("Error extension ON")
1210 OPT FNequb(7)
1220 OPT FNequb(13)
1230 .message2
1240 OPT FNequs("Error extension OFF")
1250 OPT FNequb(7)
1260 OPT FNequb(13)
1270 .address
1280 OPT FNequw(&2020)
1290 ]
1300 NEXT
1310 PROCchecksum(addr%,P%,18145,510,1280)
1320 ENDPROC
1330 :
1340 DEF PROCvars(addr%)
1350 FOR pass=0 TO 3 STEP 3
1360 P%=addr%
1370 [OPT pass
1380 .variables
1390 LDA #12
1400 JSR oswrch
1410 LDA #14
1420 JSR oswrch
1430 LDA #65
1440 STA asc
1450 LDA #&82
1460 STA vec
1470 LDA #4
1480 STA vec+1
1490 :
1500 .loop
1510 LDY #1
1520 LDA (vec),Y
1530 BEQ update
1540 STA temp
1550 DEY
1560 LDA (vec),Y
1570 STA stack
1580 :
1590 .nextvar
1600 JSR osnewl
1610 LDA asc
1620 JSR osasci
1630 LDY #2
1640 :
1650 .printloop
```

Continued ▶

Listing 1 continued

```
1660 LDA (stack),Y
1670 BEQ endprint
1680 JSR osasci
1690 INY
1700 JMP printloop
1710 :
1720 .endprint
1730 LDY #1
1740 LDA (stack),Y
1750 BEQ update
1760 TAX
1770 DEY
1780 LDA (stack),Y
1790 STA stack
1800 STX temp
1810 JMP nextvar
1820 :
1830 .update
1840 LDA #2
1850 CLC
1860 ADC vec
1870 CMP #&F6
1880 BEQ finished
1890 STA vec
1900 INC asc
1910 JMP loop
1920 :
1930 .finished
1940 JSR osnewl
1950 LDA #15
1960 JMP osasci
1970 ]
1980 NEXT
1990 PROCchecksum(addr%,P%,13132,1380,1
960)
2000 ENDPROC
2010 :
2020 DEF PROCprogram (addr%)
2030 FOR pass=0 TO 3 STEP 3
2040 P%=addr%
2050 [OPT pass
2060 .recover
2070 LDA &18
2080 STA &71
2090 LDA #0
2100 STA &70
2110 TAY
2120 LDA #13
2130 STA (&70),Y
2140 :
2150 .loop1
2160 JSR incre
2170 LDY #0
2180 LDA (&70),Y
2190 CMP #&FF
2200 BNE nottop
2210 RTS
2220 :
2230 .nottop
2240 LDA &70
2250 STA &72
2260 LDA &71
2270 STA &73
2280 JSR incre
2290 JSR incre
2300 LDA #3
2310 STA &74
2320 :
2330 .loop2
2340 JSR incre
```

Continued ►

◄ Continued

```
2350 INC &74
2360 LDA (&70),Y
2370 CMP #13
2380 BEQ n2
2390 CMP #&20
2400 BCS loop2
2410 LDA #&40
2420 STA (&70),Y
2430 JMP loop2
2440 :
2450 .n2
2460 LDA &74
2470 LDY #2
2480 STA (&72),Y
2490 JMP loop1
2500 :
2510 .incre
2520 INC &70
2530 BNE incre2
2540 INC &71
2550 .incre2
2560 RTS
2570 ]
2580 NEXT
2590 PROCchecksum(addr%,P%,9464,2060,25
60)
2600 ENDPROC
2610 :
2620 DEF FNequb(byte)
2630 ?P%=byte
2640 P%=P%+1
2650 =pass
2660 :
2670 DEF FNequw(word)
2680 ?P%=word MOD 256
2690 P%?1=word DIV 256
2700 P%=P%+2
2710 =pass
2720 :
2730 DEF FNequs(string$)
2740 $P%=string$
2750 P%=P%+LEN(string$)
2760 =pass
2770 :
2780 DEF PROCchecksum(start,end,targ,li
ne1,line2)
2790 total=0
2800 FOR byte%=start TO end-1
2810 total=total+?byte%
2820 NEXT byte%
2830 IF total=targ ENDPROC
2840 PRINT''"Checksum error :"
2850 PRINT"Please check lines ";line1;"
 to ";line2
2860 END
```

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Turn to page 99 in last month's issue for details of how to obtain your copy.

The Bar Code Teaching Pack, produced by the Micro-electronics Education Programme (MEP) and Addison-Wesley, is available direct to readers of AU. The pack includes: bar code reader, explanatory booklet; software to print bar codes; music program by Joe Telford; bar code stencil and disc or cassette of utility software.

How to enter Commanding Ideas

*The function key definition of *KEY10 (the Break key) is vital, so take special care with this. Save both listings and add your utilities as described in the article. Remember to save these under the name used in the function, eg DEF FNSIZE is saved as "SIZE". To set the extended system up, load and run listing 1 which tells you to load listing 2 and press Break. Remember, load in listing 2, do NOT run it. Press Break and the 'Extended Disc Mode' message should appear. This is not displayed on the Master, but typing *ROMs will show the utility is there.*

The sideways RAM version has been tested with UserRAM and Solidisk. Use listing 4 to check if it will run on your system.

Listing 1. Intercepts Basic's error-handling routine

```
   10 REM Basic Disc Extensions - LANG1
   20 REM by Michael Ginns
   30 REM B/B+/M
   40 REM (c) Acorn User April 1986
   50 :
   60 REM start address of utilities
   70 start=PAGE:code=&900
   80 :
   90 REM Basic's error handler
  100 error=!&202 AND &FFFF
  110 :
  120 FOR pass%=0 TO 2 STEP 2
  130 P%=code
  140 [OPT pass%
  150 LDY #0
  160 \ get error number
  170 LDA (&FD),Y
  180 \ is error a mistake?
  190 CMP #4
  200 BNE out
  210 \ was command issued
  220 \ from keyboard?
  230 LDA &C
  240 CMP #7
  250 BNE out
  260 .checkutility
  270 LDA &700,Y
  280 INY
  290 CMP #32
  300 BEQ checkutility
  310 \ first character a colon?
  320 CMP #58
  330 BNE out
  340 \ point to utility
  350 LDA #start MOD 256
  360 STA &16
  370 LDA #start DIV 256
  380 STA &17
  390 \ store high byte of PAGE
  400 LDA &18
  410 STA &8F
  420 \ reset PAGE for utility
  430 LDA &17
  440 STA &18
  450 .out
  460 JMP error
  470 ]NEXT
  480 :
  490 REM relink utilities on BREAK
  500 !&8A=!&202 AND &FFFF0000 OR code
  510 *KEY10|!|X|I|UO.|K|M|I!&202=!&8A|K
 |M|IPA.=TOP+256|K|M|INEW|K|M|HExtended D
 isc Mode|J|U|M
  520 PRINT''"Basic intercepted"
  530 PRINT'''"LOAD 'LANG2' and then pre
 ss BREAK"
  540 END
```

Listing 2. Basic Disc Extensions

```
   10 REM Basic Disc Extensions - LANG2
   20 REM by Michael Ginns
   30 REM B/B+/M
   40 REM (c) Acorn User April 1986
   50 :
   60 ?&8E=PAGE DIV 256
   70 ON ERROR PAGE=?&8E*256:GOTO 150
   80 REPEAT
   90 $&700=$&701
  100 UNTIL NOT(?&700=32)
  110 $&700=$&700+STRING$(&F0-LEN($&700)
 ," ")
  120 IF FNcheck ?&C000=EVAL("FN"+$&700)
  130 PAGE=?&8F*256
  140 END
  150 IF ERR=29 PRINT'"Mistake" ELSE REP
 ORT:PRINT
  160 PAGE=?&8F*256
  170 END
  180 DEF FNcheck
  190 LOCAL A%,B%,C%,L%,X%,Y%
  200 A%=INSTR($&700," ")
  210 $&7A0=LEFT$($&700,A%)
  220 C%=OPENIN($&7A0)
  230 IF C%=0 PRINT"No such utility":=0
  240 L%=EXT#C%
  250 CLOSE#0
  260 B%=(HIMEM-L%-512) DIV &100*&100
  270 IF B%<(!2 AND &FFFF) PRINT"Insuffi
 cient utility space":=0
  280 $&7A0="L. "+$&7A0+" "+STR$~B%
  290 X%=&A0:Y%=7
  300 CALL &FFF7
  310 PAGE=B%
  320 =-1
```

Listing 3. Saves the sideways code on disc as 'SIDEBAS'

```
   10 REM SIDEBAS Source Program
   20 REM by Michael Ginns
   30 REM B/B+/M
   40 REM (c) Acorn User April 1986
   50 :
   60 MODE 6:LOMEM=&2A00
   70 DIM code% &200,oscli% 40
   80 call$="?-1="+CHR$(164)+STRING$(11,
 " ")+":?24=?&8F"+CHR$(13)
   90 report$=CHR$(246)+":"+CHR$(241)+CH
 R$(13)
  100 PROCass
  110 PROCcheck
  120 PROCsave
  130 END
  140 :
  150 DEF PROCass
  160 F%=&8000-code%
  170 FOR pass=0 TO 3 STEP 3
  180 P%=code%
  190 [OPT pass
  200 :
  210 BRK
  220 BRK
  230 BRK
  240 JMP entry+F%
  250 OPT FNequb(&82)
  260 OPT FNequw(&0117)
  270 OPT FNequs("Extended Basic")
  280 OPT FNequb(0)
  290 OPT FNequs("(C) Acorn User 1986")
  300 OPT FNequb(0)
  310 :
  320 .entry
  330 STA type+F%
  340 STX xstore+F%
```

Continued ▶

Listing 3 continued

```
350 STY ystore+F%
360 CMP #9
370 BNE over1
380 JSR help+F%
390 .over1
400 CMP #6
410 BNE over2
420 JSR brk+F%
430 .over2
440 LDA type+F%
450 LDX xstore+F%
460 LDY ystore+F%
470 JMP nextrom+F%
480 :
490 .help
500 LDA (&F2),Y
510 CMP #13
520 BNE nohelp
530 LDY #0
540 .print
550 INY
560 JSR &FFE3
570 LDA &8008,Y
580 BNE print
590 .nohelp
600 JMP &FFE7
610 :
620 .brk
630 LDA &17
640 CMP #7
650 BNE directmode
660 LDA &8F
670 STA &18
680 LDX #3
690 .copyerror
700 LDA errorcode+F%,X
710 STA &7A0,X
720 DEX
730 BPL copyerror
740 LDA #&A0
750 STA &16
760 LDA #7
770 STA &17
780 .finish
790 RTS
800 .directmode
810 LDA &FD
830 STA &F6
830 LDA &FE
840 STA &F7
850 LDY #255
860 LDX #0
870 LDA #186
```

Continued ▶

◀ Continued

```
880 JSR &FFF4
890 JSR &FFB9
900 CMP #4
910 BNE finish
920 LDA &C
930 CMP #7
940 BNE finish
950 LDY #0
960 .start
970 LDA &700,Y
980 INY
990 CMP #32
1000 BEQ start
1010 CMP #58
1020 BNE finish
1030 LDX #25
1040 .copybasic
1050 LDA bascode+F%,X
1060 STA &7E0,X
1070 DEX
1080 BPL copybasic
1090 TYA
1100 TAX
1110 .end
1120 LDA &700,Y
1130 INY
1140 CMP #13
1150 BNE end
1160 STY index+F%
1170 LDY #0
1180 .move
1190 LDA &700,X
1200 STA &700,Y
1210 INX
1220 INY
1230 CPX index+F%
1240 BCC move
1250 .clear
1260 LDA #32
1270 STA &700,Y
1280 INY
1290 CPY #&A0
1300 BNE clear
1310 LDY #0
1320 .filename
1330 LDA &700,Y
1340 CMP #32
1350 BEQ complete
1360 CMP #13
1370 BEQ complete
1380 STA &7E5,Y
1390 INY
1400 CPY #10
```

Continued ▶

◀ Continued

```
1410 BCC filename
1420 .complete
1430 LDA #&40
1440 LDX #&E5
1450 LDY #&07
1460 JSR &FFCE
1470 TAY
1480 BEQ notfound
1490 LDX #&70
1500 LDA #2
1510 JSR &FFDA
1520 LDA #0
1530 JSR &FFCE
1540 LDA &72
1550 ORA &73
1560 BNE noroom
1570 LDA 6
1580 SEC
1590 SBC &70
1600 LDA 7
1610 SBC &71
1620 BCC noroom
1630 SBC #2
1640 STA &71
1650 BCC noroom
1660 CMP 3
1670 BCC noroom
1680 LDA #&E5
1690 STA &7A0
1700 LDA #7
1710 STA &7A1
1720 LDA #0
1730 STA &7A2
1740 STA &7A4
1750 STA &7A5
1760 STA &7A6
1770 LDA &71
1780 STA &7A3
1790 LDA #&FF
1800 LDX #&A0
1810 LDY #7
1820 JSR &FFDD
1830 LDA &18
1840 STA &8F
1850 LDA &71
1860 STA &18
1870 LDA #7
1880 STA &17
1890 LDA #&E0
1900 STA &16
1910 LDA #0
1920 STA &4F8
```

Continued bottom left

◀ Continued

```
1930 STA &4F9
1940 RTS
1950 .noroom
1960 LDY #17
1970 .notfound
1980 STY &FD
1990 .loop
2000 LDA message+F%,Y
2010 STA &100,Y
2020 INY
2030 CMP #0
2040 BNE loop
2050 LDA #1
2060 STA &FE
2070 RTS
2080 .nextrom
2090 RTS
```

Continued ▶

◀ Continued

```
2100 :
2110 .type
2120 OPT FNequb(0)
2130 .xstore
2140 OPT FNequb(0)
2150 .ystore
2160 OPT FNequb(0)
2170 .index
2180 OPT FNequb(0)
2190 .bascode
2200 OPT FNequs(call$)
2210 .errorcode
2220 OPT FNequs(report$)
2230 .message
2240 OPT FNequb(128)
2250 OPT FNequs("No such utility")
2260 OPT FNequb(0)
```

Continued ▶

Ginn's listing 3 continued

```
 2270 OPT FNequb(129)
 2280 OPT FNequs("Insufficient utility s
pace")
 2290 OPT FNequb(0)
 2300 ]NEXT pass
 2310 ENDPROC
 2320 :
 2330 DEF PROCcheck
 2340 total%=0
 2350 FOR byte%=code% TO P%-1
 2360 total%=total%+?byte%
 2370 NEXT byte%
 2380 IF total%=52503 ENDPROC
 2390 PRINT"Cheksum error - please check
listing"
 2400 END
 2410 :
 2420 DEF PROCsave
 2430 PROCoscli("SAVE SIDEBAS "+STR$~cod
e%+" "+STR$~(P%-1))
 2440 ENDPROC
 2450 :
 2460 DEF PROCoscli($oscli%)
 2470 PRINT"*";$oscli%
 2480 X%=oscli%:Y%=oscli% DIV 256
 2490 CALL &FFF7:ENDPROC
 2500 :
 2510 DEF FNequb(byte)
 2520 ?P%=byte
 2530 P%=P%+1
 2540 =pass
 2550 :
 2560 DEF FNequw(word)
 2570 ?P%=word MOD 256
 2580 P%?1=word DIV 256
 2590 P%=P%+2
 2600 =pass
 2610 :
 2620 DEF FNequs(string$)
 2630 $P%=string$
 2640 P%=P%+LEN(string$)
 2650 =pass
```

Listing 4 contains a ROM image as data. Enter the listing and run it. Errors will be reported. The program will save the image, which is stored at &C00, to disc as "B.TEST". Load B.TEST into sideways RAM, press CTRL-Break and type:

!&70=&FFFFFFFF <RETURN>

*Now type *HELP followed by:*

PRINT ~ ?&70, ~?&71 <RETURN>

The values AA and 88 show the program will work. Other values (most likely 0 and 0) mean the program will not work with your sideways RAM. We would like to hear from readers with other sideways RAM systems so we can publish a compatibility list.

Listing 4. Test program

```
  10 REM SRAM Test Program
  20 RESTORE
  30 C%=&C00:T%=0
  40 FOR L%=0 TO 77
  50 READ D%
  60 C%?L%=D%
  70 T%=T%+D%
  80 NEXT
  90 IF T%<>6934 PRINT"Error!":END
 100 *SAVE B.TEST C00 CDF
 110 END
 120 DATA 0,0,0,76,44,128
 130 DATA 130,23,1,69,120,116
 140 DATA 101,110,100,101,100,32
 150 DATA 66,97,115,105,99,0
 160 DATA 40,67,41,32,65,99
 170 DATA 111,114,110,32,85,115
```

◄ Continued

```
 180 DATA 101,114,32,49,57,56
 190 DATA 54,0,72,138,72,152
 200 DATA 72,169,170,141,75,128
 210 DATA 173,75,128,133,112,169
 220 DATA 136,141,75,128,173,75
 230 DATA 128,133,113,104,168,104
 240 DATA 170,104,96,0,0,0
```

Joe's Jottings, see page 80

All the programs are straightforward and should provide no problems when keying in. Note however that listings 1 to 4 should be added to the end of the listing 5 (Content) to get the final version for use.

Listing 1. Defines a function called 'readbook'

```
 2020 DEF FNreadbook
 2030 LOCAL no
 2040 no=7-(ADVAL 2 DIV 10000)
 2050 IF no=4 THEN =6
 2060 IF no=6 THEN =4
 2070 IF no<7 THEN =no
 2080 no=13-(ADVAL 1 DIV 10000)
 2090 IF no=10 THEN =12
 2100 IF no=12 THEN =10
 2110 IF no<13 THEN =no
 2120 =0
```

Listing 2. Defines a function called 'pressbook'

```
 2140 DEF FNpressbook
 2150 LOCAL no,no2
 2160 REPEAT
 2170 no=FNreadbook
 2180 no2=TIME+2
 2190 REPEAT UNTIL TIME>no2
 2200 no2=FNreadbook
 2210 UNTIL no=no2:IF no>0 VDU 7
 2220 REPEAT UNTIL FNreadbook=0
 2230 =no
```

Listing 3. Defines a function called 'getpress'

```
 2250 DEF FNgetpress
 2260 LOCAL no,A$
 2270 REPEAT A$=INKEY$(0)
 2280 IF A$="0" A$="10"
 2290 IF A$="" AND D%=0 THEN A$=STR$FNpr
essbook
 2300 IF A$=CHR$13 A$="12"
 2310 IF A$=CHR$127 A$="11"
 2320 no=VALA$
 2330 UNTIL no>0
 2340 =no
```

Listing 4. Defines a function called 'getpage'

```
 2360 DEF FNgetpage(len)
 2370 LOCAL A$,B$
 2380 B$=""
 2390 REPEAT
 2400 REPEAT
 2410 A$=INKEY$(0)
 2420 IF INSTR("0123456789"+CHR$13+CHR$1
27,A$)=0 THEN A$="":VDU 7
 2430 IF A$="" AND D%=0 THEN A$=STR$FNpr
essbook:IF A$="0" A$=""
```

Continued ►

Listing 4 continued

```
 2440 UNTIL A$<>""
 2450 IF A$="12" OR A$=CHR$(13) UNTIL TR
UE:=VALB$
 2460 IF A$="10" A$="0"
 2470 IF A$="11" A$=CHR$(127)
 2480 IF A$=CHR$(127) AND LEN(B$)>0 B$=L
EFT$(B$,LEN(B$)-1):VDU ASCA$,11,9,ASCA$,
10:UNTIL 0
 2490 IF A$=CHR$(127) AND LEN(B$)=0 UNTI
L 0
 2500 IF LENB$<len VDU ASCA$,11,8,ASCA$,
10:B$=B$+A$ ELSE VDU 7
 2510 UNTIL FALSE
```

Listing 5. Content: the first part of Collection Suite (page 86)

```
   10 REM Contents V1.00
   20 REM by Joe Telford
   30 REM B/B+/M
   40 REM + Tandy Electronic Book
   50 REM (c) Acorn User April 1986
   60 :
   70 DIM oscar% 80
   80 DIM buffer% &E00
   90 ON ERROR PROCerror
  100 IF L%<1 OR L%>5 THEN L%=6
  110 MODE 7
  120 PROCtitle
  130 ON ERROR PROCerror
  140 REPEAT
  150 C%=FNrwatc
  160 IF C%=6 UNTIL TRUE:PRINT''"done!";
:END
  170 B%=FNmenu
  180 H%=OPENIN(STR$B%)
  190 CLOSE#0
  200 IF C%=1 AND H%<>0 UNTIL TRUE:CHAIN
"ReadBk":END
  210 IF C%=2 AND H%=0 UNTIL TRUE:CHAIN"
WriteBk":END
  220 IF C%=3 AND H%<>0 UNTIL TRUE:CHAIN
"WriteBk":END
  230 IF C%=4 AND H%<>0 PROCdelete(STR$B
%):UNTILFALSE
  240 IF C%=5 AND H%<>0 PROCcopy(STR$B%)
:UNTILFALSE
  250 PROCerr(C%)
  260 UNTIL FALSE
  270 :
  280 DEF PROCcopyfile(f$,n$)
  290 PROCoscar("LOAD "+f$+" "+STR$~buff
er%)
  300 PROCoscar("SAVE "+n$+" "+STR$~buff
er%+" +E00")
  310 ENDPROC
  320 :
  330 DEF PROCcopy(file$)
  340 LOCAL dummy%,loop%
  350 C%=6
  360 newfile$=STR$(FNmenu)
  370 H%=OPENIN(newfile$)
  380 CLOSE#0
  390 IF H%<> 0 PROCerr(6):ENDPROC
  400 CLS:PRINTf$;CHR$127
  410 PRINTf$"CONTENTS"'f$"CONTENTS"
  420 FOR loop%=1 TO 2:PRINTh$"You wish
to copy page "file$"....":NEXT loop%
  430 PRINTf$;CHR$127;STRING$(36," ")
  440 FOR loop%=1 TO 4:PRINTg$
  450 NEXT loop%
  460 FOR loop%=1 TO 2
  470 PRINTg$"    1..........Copy to page
 ";newfile$"."
  480 NEXT loop%
  490 FOR loop%=1 TO 2
```

Continued ▶

◀ Continued

```
  500 PRINTg$"    2..........Cancel comma
nd."
  510 NEXT loop%
  520 FOR loop%=1 TO 8:PRINTg$
  530 NEXT loop%
  540 PRINTTAB(0,22);
  550 FOR loop%=1 TO 2
  560 PRINTf$"Choice :"SPC19
  570 NEXT loop%
  580 PRINTTAB(13,23);
  590 REPEAT dummy%=FNgetpress
  600 UNTIL dummy%>0 AND dummy%<3
  610 VDU dummy%+48,11,8,dummy%+48
  620 IF dummy%=2 ENDPROC
  630 PROCcopyfile(file$,newfile$)
  640 C%=5
  650 ENDPROC
  660 :
  670 DEF PROCdelete(file$)
  680 LOCAL dummy%,loop%
  690 CLS:PRINTf$;CHR$127
  700 PRINTf$"CONTENTS"'f$"CONTENTS"
  710 FOR loop%=1 TO 2
  720 PRINTh$"You wish to tear out a pag
e......"
  730 NEXT loop%
  740 PRINTf$;CHR$127;STRING$(36," ")
  750 FOR loop%=1 TO 4:PRINTg$
  760 NEXT loop%
  770 FOR loop%=1 TO 2
  780 PRINTg$"    1..........Remove page
";file$"."
  790 NEXT loop%
  800 FOR loop%=1 TO 2
  810 PRINTg$"    2..........Cancel comma
nd."
  820 NEXT loop%
  830 FOR loop%=1 TO 8:PRINTg$
  840 NEXT loop%
  850 PRINTTAB(0,22);
  860 FOR loop%=1 TO 2
  870 PRINTf$"Choice :"SPC19
  880 NEXT loop%
  890 PRINTTAB(13,23);
  900 REPEAT dummy%=FNgetpress
  910 UNTIL dummy%>0 AND dummy%<3
  920 VDU dummy%+48,11,8,dummy%+48
  930 IF dummy%=2 ENDPROC
  940 PROCoscar("DELETE "+STR$B%)
  950 ENDPROC
  960 :
  970 DEF PROCoscar(x$)
  980 $oscar%=x$
  990 X%=oscar% MOD 256
 1000 Y%=oscar% DIV 256
 1010 CALL &FFF7
 1020 ENDPROC
 1030 :
 1040 DEF PROCerror
 1050 IF ERR=17 ENDPROC
 1060 IF ERR=214 PROCerr(214):ENDPROC
 1070 REPORT:PRINT" at ";ERL
 1080 END
 1090 :
 1100 DEF PROCerr(err)
 1110 LOCAL loop%
 1120 PRINTTAB(0,12)g$;CHR$127;STRING$(3
6," ")
 1130 IF err=1 OR err=3 OR err=4 OR err=
5 FOR loop%=1 TO 2:PRINTg$"     That page
 does not exist!":NEXT loop%
 1140 IF err=2 OR err=6 FOR loop%=1 TO 2
:PRINTg$"     That page already exists! "
:NEXT loop%
 1150 IF err=214 FOR loop%=1 TO 2:PRINTg
$"     Program not found on disc":NEXT lo
op%
 1160 FOR loop%=1 TO 2
```

Continued ▶

Joe's listing 5 continued

```
  1170 PRINTg$"    Press a number to conti
 nue."
  1180 NEXT loop%
  1190 PRINTg$;STRING$(36," ")
  1200 REPEAT dummy%=FNgetpress
  1210 UNTIL dummy%>0 AND dummy%<13
  1220 ENDPROC
  1230 :
  1240 DEF PROCtitle
  1250 LOCAL dummy%,loop%
  1260 f$=CHR$132+CHR$157+CHR$131+CHR$141
  1270 g$=CHR$129+CHR$157+CHR$131+CHR$141
  1280 PRINTf$;CHR$127
  1290 PRINTf$"COLLECTIONS";CHR$140;CHR$1
 35;"A program for the..."
  1300 PRINTf$"COLLECTIONS."
  1310 h$=CHR$132+CHR$157+CHR$134+CHR$141
  1320 FOR loop%=1 TO 2
  1330 PRINTh$"Tandy Electronic Book & BB
 C Micro"
  1340 NEXT loop%
  1350 PRINTf$;CHR$127;STRING$(36," ")
  1360 PRINTTAB(0,10)g$;CHR$127
  1370 FOR loop%=1 TO 2
  1380 PRINTg$;SPC8"Press any number"
  1390 NEXT loop%
  1400 FOR loop%=1 TO 2
  1410 PRINTg$;SPC5"for the Contents page
 ."
  1420 NEXT loop%
  1430 PRINTg$;CHR$127;
  1440 PRINTTAB(0,22);
  1450 FOR loop%=1 TO 2
  1460 PRINTf$;SPC6"(c) Joe Telford 1986"
  1470 NEXT loop%
  1480 IF FNreadbook>0 THEN D%=1 ELSE D%=
 0
  1490 REPEAT dummy%=FNgetpress
  1500 UNTIL dummy%>0 AND dummy%<13
  1510 ENDPROC
  1520 :
  1530 DEF FNrwatc
  1540 CLS
  1550 LOCAL loop%,a$
  1560 PRINTf$;CHR$127
  1570 PRINTf$"CONTENTS"'f$"CONTENTS"
  1580 FOR loop%=1 TO 2
  1590 PRINTh$"Choose from the yellow num
 bers.."
  1600 NEXT loop%
  1610 PRINTf$;CHR$127'g$'g$
  1620 RESTORE
  1630 FOR loop%=1 TO L%:READ a$
  1640 a$=g$+a$:PRINTa$'a$:NEXT loop%
  1650 j$=CHR$129+CHR$157+CHR$133+CHR$141
  1660 IF L%<6 FOR loop%=L%+1 TO 6:READ a
 $:a$=j$+a$:PRINTa$'a$:NEXT loop%
  1670 DATA"   1..........Read a page."
  1680 DATA"   2..........Write a page."
  1690 DATA"   3..........Alter a page."
  1700 DATA"   4..........Tear out a page
 ."
  1710 DATA"   5..........Copy a page."
  1720 DATA"   6..........Close book (End
 )."
  1730 FOR loop%=1 TO 4:PRINTg$
  1740 NEXT loop%
  1750 PRINTTAB(0,22)f$"Choice :"SPC19
  1760 PRINTf$"Choice :"SPC28;
  1770 PRINTTAB(13,23);
  1780 REPEAT C%=FNgetpress
  1790 UNTIL C%>0 AND C%<(L%+1)
  1800 VDU C%+48,11,8,C%+48
  1810 =C%
  1820 :
  1830 DEF FNmenu
  1840 LOCAL b$,loop%
  1850 IF C%=1 b$="(Pages which can be re
 ad........)"
```

Continued ►

◄ Continued

```
  1860 IF C%=2 b$="(Pages which cannot be
 written..)"
  1870 IF C%=3 b$="(Pages which can be al
 tered.....)"
  1880 IF C%=4 b$="(Pages which can be to
 rn out....)"
  1890 IF C%=5 b$="(Pages which can be co
 pied from.)"
  1900 IF C%=6 b$="(Pages which cannot be
 copied to)"
  1910 CLS:PRINT'':*CAT
  1920 PRINTTAB(0,0);f$;CHR$127
  1930 PRINTf$"CONTENTS"'f$"CONTENTS"
  1940 PRINTh$;b$'h$;b$
  1950 PRINTf$;CHR$127;STRING$(36," ")
  1960 PRINTTAB(0,22);
  1970 FOR loop%=1 TO 2
  1980 PRINTf$"Page no:"SPC14"(or ESCAPE)
 "
  1990 NEXT loop%
  2000 PRINTTAB(13,23);:=FNgetpage(3)
```

Listing 6. (Readbk) is chained by Content (page 115)

```
    10 REM Readbook V1.00
    20 REM by Joe Telford
    30 REM B/B+/M
    40 REM + Tandy Electronic Book
    50 REM (c) Acorn User April 1986
    60 :
    70 IF C%<>1 CHAIN"Content":END
    80 DIM oscar% 80
    90 DIM file% &E00
   100 *FX 229,1
   110 IF FNreadbook>0 THEN D%=1 ELSE D%=
 0
   120 MODE 7
   130 PROCloadarray
   140 panel=1
   150 REPEAT
   160 panel=FNshowpanel(panel)
   170 UNTILpanel=27
   180 *FX 11,0
   190 REPEAT UNTIL INKEY$(0)=""
   200 *FX 12,0
   210 *FX 229,0
   220 CHAIN"Content"
   230 END
   240 :
   250 DEF PROCloadarray
   260 PROCoscar("LOAD "+STR$B%+" "+STR$~
 file%)
   270 ENDPROC
   280 :
   290 DEF PROCoscar(x$)
   300 $oscar%=x$
   310 X%=oscar% MOD 256
   320 Y%=oscar% DIV 256
   330 CALL &FFF7
   340 ENDPROC
   350 :
   360 DEF PROCprintpage(panel)
   370 LOCAL loop%,counter%
   380 PRINTf$;"COLLECTIONS."CHR$140;CHR$
 130"  By Joe Telford"
   390 PRINTf$;"COLLECTIONS."
   400 h$=CHR$129+CHR$157+CHR$135+CHR$141
   410 FOR loop%=1 TO 2
   420 PRINTh$"Page ";STR$B%;":"TAB(20)"R
 eading panel ";panel;" "
   430 NEXT loop%
   440 FOR loop%=1 TO 9
   450 ptr%=33*(loop%-1)+297*(panel-1)
   460 FOR counter%=1 TO 2
   470 PRINTg$;TAB(5);$(file%+ptr%)
   480 NEXT counter%
```

Continued ►

Listing 6 continued

```
 490 NEXT loop%
 500 ENDPROC
 510 :
 520 DEF FNshowpanel(panel)
 530 LOCAL loop%,choice$
 540 PRINTTAB(0,0);
 550 f$=CHR$129+CHR$157+CHR$131+CHR$141
 560 g$=CHR$135+CHR$157+CHR$132+CHR$141
 570 PROCprintpage(panel)
 580 PRINTf$;CHR$127
 590 PRINTh$"Press  ESCAPE  for Content
s page."
 600 PRINTh$"Press  ESCAPE  for Content
s page.";
 610 PRINTTAB(36,24);
 620 =FNgetpress
 630 :
 640 DEF FNreadbook
 650 LOCAL no
 660 no=7-(ADVAL 2 DIV 10000)
 670 IF no=4 THEN =6
 680 IF no=6 THEN =4
 690 IF no<7 THEN =no
 700 no=13-(ADVAL 1 DIV 10000)
 710 IF no=10 THEN =12
 720 IF no=12 THEN =10
 730 IF no<13 THEN =no
 740 =0
 750 :
 760 DEF FNgetpress
 770 LOCAL no,A$
 780 REPEAT A$=INKEY$(0)
 790 IF A$="0" A$="10"
 800 IF A$="" AND D%=0 THEN A$=STR$FNpr
essbook
 810 IF A$=CHR$13 A$="12"
 820 IF A$=CHR$127 A$="11"
 830 no=VALA$:IF A$=CHR$27 THEN no=27
 840 UNTIL no>0
 850 =no
 860 :
 870 DEF FNpressbook
 880 LOCAL no,no2
 890 REPEAT
 900 no=FNreadbook:no2=TIME+2
 910 REPEAT UNTIL TIME>no2
 920 no2=FNreadbook
 930 UNTIL no=no2:IF no>0 VDU 7
 940 REPEAT UNTIL FNreadbook=0
 950 =no
```

Listing 7. (Writebk) is chained by Content (page 115)

```
  10 REM Writebook V1.00
  20 REM by Joe Telford
  30 REM B/B+/M
  40 REM + Tandy Electronic Book
  50 REM (c) Acorn User April 1986
  60 :
  70 IF C%<2 OR C%>3 CHAIN"Content":END
  80 DIM oscar% 80
  90 DIM file% &E00
 100 *FX 229,1
 110 *KEY0 |M |M
 120 IF FNreadbook>0 THEN D%=1 ELSE D%=
0
 130 MODE 7
 140 IF C%=2 PROCerasearray ELSE PROClo
adarray
 150 panel=1
 160 ON ERROR PROCerror
 170 REPEAT
 180 choice$=FNshowpanel(panel)
 190 IF choice$>CHR$128 AND choice$<CHR
$138 PROCsetfkey(ASCchoice$-128)
 200 IF choice$="L" panel=(12+panel)MOD
```

Continued ▶

◀ Continued

```
13
 210 IF choice$="R" panel=(panel+1)MOD1
3
 220 IF choice$="U" AND panel>0 PROCupd
ate(panel)
 230 IF choice$=CHR$27 THEN panel=0
 240 UNTIL choice$="U" AND panel=0
 250 PROCsavearray
 260 *FX 229,0
 270 CHAIN"CONTENT"
 280 END
 290 :
 300 DEF PROCerror
 310 IF ERR=251 PROCerr(251):ENDPROC
 320 CLS:REPORT:PRINT": ERROR ";ERR
 330 END
 340 :
 350 DEF PROCerr(err)
 360 PRINTTAB(0,10);f$;CHR$127;STRING$(
36," ")
 370 IF err=251 FOR loop%=0 TO 1:PRINTf
$SPC5"Too much set in red keys"SPC6:NEXT
 loop%
 380 FOR loop%=0 TO 1
 390 PRINTf$SPC4"Press a number to cont
inue"SPC4
 400 NEXT loop%
 410 PRINTf$;CHR$127;STRING$(36," ")
 420 REPEAT dummy%=FNgetpress
 430 UNTIL dummy%>0 AND dummy%<13
 440 ENDPROC
 450 :
 460 DEF PROCsetfkey(key)
 470 LOCAL keyptr%
 480 keyptr%=33*(key-1)+297*(panel-1)
 490 key$=$(file%+keyptr%)
 500 IF RIGHT$(key$,1)=" " THEN REPEAT
key$=LEFT$(key$,LENkey$-1):UNTIL RIGHT$(
key$,1)<>" "
 510 PROCoscar("KEY "+STR$key+" "+key$)
 520 PRINTTAB(4,24)"Last Key Set: ";key
;" ";
 530 ENDPROC
 540 :
 550 DEF PROCsavearray
 560 PROCoscar("SAVE "+STR$B%+" "+STR$~
file%+" +E00")
 570 ENDPROC
 580 :
 590 DEF PROCloadarray
 600 PROCoscar("LOAD "+STR$B%+" "+STR$~
file%)
 610 ENDPROC
 620 :
 630 DEF PROCerasearray
 640 LOCALpanel,line
 650 FOR panel=1 TO 12
 660 FOR line=1 TO 9
 670 ptr%=33*(line-1)+297*(panel-1)
 680 $(file%+ptr%)=STRING$(32," ")
 690 NEXT line
 700 NEXT panel
 710 ENDPROC
 720 :
 730 DEF PROCupdate(panel)
 740 *FX 4,2
 750 *KEY14 "D"
 760 *KEY15 "U"
 770 line%=1
 780 PROCshowbar(panel,line%)
 790 REPEAT
 800 A$=INKEY$(0)
 810 IF A$="D" PROCdown
 820 IF A$="U" PROCup
 830 IF A$=CHR$13 PROCgetline(panel,lin
e%)
 840 UNTIL A$=CHR$27
 850 *FX 11,0
```

Continued ▶

Joe's listing 7 continued

```
 860 REPEAT UNTIL INKEY(0)<>27
 870 *FX 12,0
 880 *FX 4,0
 890 ENDPROC
 900 :
 910 DEF PROCgetline(p,f)
 920 *FX 4,0
 930 LOCAL line$
 940 PRINTTAB(7,f*2+3);
 950 line$=FNgetpage(32)
 960 *FX 4,2
 970 IF line$="" PROCshowbar(p,f):ENDPROC
 980 ptr%=33*(f-1)+297*(p-1)
 990 $(file%+ptr%)=line$+STRING$(32-LENline$," ")
 1000 PROCshowbar(p,f)
 1010 ENDPROC
 1020 :
 1030 DEF PROCdown
 1040 IF line%=9 VDU 7:ENDPROC
 1050 line%=line%+1
 1060 PROCshowbar(panel,line%)
 1070 ENDPROC
 1080 :
 1090 DEF PROCup
 1100 IF line%=1 VDU 7:ENDPROC
 1110 line%=line%-1
 1120 PROCshowbar(panel,line%)
 1130 ENDPROC
 1140 :
 1150 DEF PROCshowbar(p,f)
 1160 PRINTTAB(0,0);
 1170 PROCprintpage(p)
 1180 PRINTTAB(0,f*2+3);
 1190 VDU 129,11,8,129,10
 1200 ENDPROC
 1210 :
 1220 DEF PROCoscar(x$)
 1230 $oscar%=x$
 1240 X%=oscar% MOD 256
 1250 Y%=oscar% DIV 256
 1260 CALL &FFF7
 1270 ENDPROC
 1280 :
 1290 DEF PROCprintpage(panel)
 1300 LOCAL loop%,counter%
 1310 PRINTf$;CHR$127
 1320 FOR loop%=1 TO 2
 1330 PRINTf$"Writing Page ";STR$B%;":"TAB(30)"Panel ";panel;" "
 1340 NEXT loop%
 1350 PRINTf$;CHR$127
 1360 IF panel=0 PROCpanel0:ENDPROC
 1370 FOR loop%=1 TO 9
 1380 ptr%=33*(loop%-1)+297*(panel-1)
 1390 FOR counter%=1 TO 2
 1400 PRINT g$;loop%;TAB(7);$(file%+ptr%)
 1410 NEXT counter%
 1420 NEXT loop%
 1430 ENDPROC
 1440 :
 1450 DEF PROCpanel0
 1460 LOCAL loop%
 1470 h$=CHR$129+CHR$157+CHR$131+CHR$141
 1480 FOR loop%=1 TO 6
 1490 PRINTh$+STRING$(35," "):NEXT
 1500 PRINTh$;SPC6"If you have finished, "SPC5
 1510 PRINTh$;SPC6"If you have finished, "SPC5
 1520 PRINTh$"    Press  ^  to save your work  "
 1530 PRINTh$"    Press  ^  to save your work  "
 1540 FOR loop%=1 TO 8
 1550 PRINTh$+STRING$(35," ")
 1560 NEXT loop%
```

Continued ▶

◀ Continued

```
 1570 ENDPROC
 1580 :
 1590 DEF FNshowpanel(panel)
 1600 LOCAL loop%,c$
 1610 PRINTTAB(0,0);
 1620 f$=CHR$133+CHR$157+CHR$131+CHR$141
 1630 g$=CHR$132+CHR$157+CHR$135+CHR$141
 1640 PROCprintpage(panel)
 1650 FOR loop%=1 TO 2
 1660 PRINTf$"Last"CHR$129"[    ^"CHR$131"Do this panel"CHR$129"^    ]"CHR$131"Next"
 1670 NEXT loop%
 1680 PRINTf$;CHR$127;" Last Key Set: ";TAB(26,24);"ESCAPE leaves";
 1690 *FX 4,2
 1700 *KEY12 L
 1710 *KEY13 R
 1720 *KEY15 U
 1730 PRINTTAB(33,23);
 1740 REPEAT c$=CHR$(GET AND 223)
 1750 UNTIL (c$>CHR$128 AND c$<CHR$138) OR INSTR("LRU"+CHR$27,c$)
 1760 *FX 4,0
 1770 =c$
 1780 :
 1790 DEF FNreadbook
 1800 LOCAL no
 1810 no=7-(ADVAL 2 DIV 10000)
 1820 IF no=4 THEN =6
 1830 IF no=6 THEN =4
 1840 IF no<7 THEN =no
 1850 no=13-(ADVAL 1 DIV 10000)
 1860 IF no=10 THEN =12
 1870 IF no=12 THEN =10
 1880 IF no<13 THEN =no
 1890 =0
 1900 :
 1910 DEF FNgetpress
 1920 LOCAL no,A$
 1930 REPEAT A$=INKEY$(0)
 1940 IF A$="0" A$="10"
 1950 IF A$="" AND D%=0 THEN A$=STR$FNpressbook
 1960 IF A$=CHR$13 A$="12"
 1970 IF A$=CHR$127 A$="11"
 1980 no=VALA$
 1990 UNTIL no>0
 2000 =no
 2010 :
 2020 DEF FNpressbook
 2030 LOCAL no,no2
 2040 REPEAT
 2050 no=FNreadbook:no2=TIME+2
 2060 REPEAT UNTIL TIME>no2
 2070 no2=FNreadbook
 2080 UNTIL no=no2:IF no>0 VDU 7
 2090 REPEAT UNTIL FNreadbook=0
 2100 =no
 2110 :
 2120 DEF FNgetpage(len)
 2130 LOCAL A$,B$
 2140 B$=""
 2150 REPEAT
 2160 REPEAT
 2170 A$=INKEY$(0):IF A$<CHR$13 A$=""
 2180 IF A$>CHR$13 AND A$<CHR$32 A$=""
 2190 IF A$="" AND D%=0 THEN A$=STR$FNpressbook:IF A$="0" A$=""
 2200 UNTIL A$<>""
 2210 IF A$="12" OR A$=CHR$(13) UNTIL TRUE:=B$
 2220 IF A$="10" A$="0"
 2230 IF A$="11" A$=CHR$(127)
 2240 IF A$=CHR$(127) AND LEN(B$)>0 B$=LEFT$(B$,LEN(B$)-1):VDU ASCA$,11,9,ASCA$,10:UNTIL 0
 2250 IF A$=CHR$(127) AND LEN(B$)=0 UNTIL 0
 2260 IF LENB$<len VDU ASCA$,11,8,ASCA$,10:B$=B$+A$ ELSE VDU7
 2270 UNTIL FALSE
```

Spray Away, see page 88

Listing 1. Three Dee works out the cosine of an angle

```
   10 REM Three Dee Shades
   20 REM by Peter Voke
   30 REM B/B+/M/E
   40 REM (c) Acorn User April 1986
   50 :
   60 ON ERROR MODE 6:PROCerr
   70 DIM oscli% 40
   80 REPEAT
   90 MODE 6
  100 PROCmenus
  110 MODE 1
  120 VDU 23;11;0;0;0;
  130 HIMEM=&2F00
  140 IF L% THEN PROCload
  150 IF NOT M% THEN PROCcreate
  160 PROCkeyin
  170 UNTIL FALSE
  180 :
  190 DEF PROCmenus
  200 VDU 19;4,0;0
  210 *FX 225,48,0
  220 PRINT'TAB(15)"THREE  DEE"
  230 VDU 28,4,24,39,7
  240 PRINT"1. Create Screen"'
  250 PRINT"2. Inspect Screen"'
  260 Q%=FNin("Select 1 or 2",1,2)
  270 M%=(Q%=2)
  280 IF M% THEN PROCfile:ENDPROC
  290 C%=1:D%=4:E%=6:F%=0
  300 CLS
  310 A%=FNin("Fineness (1-8)",1,8)*4
  320 B=FNin("Scatter (0-10)",0,10)/10
  330 S%=FNin("Scale (10-100)",10,100)*5
  340 H%=FNin("X shift (-125-125)",-125,
125)*5+640
  350 G%=FNin("Y shift (-100-100)",-100,
100)*5+512
  360 CLS
  370 PRINT"1. R is a function of Y"'
  380 PRINT"2. R-squared is a function o
f Y"'
  390 PRINT"3. R-inverse is a function o
f Y"''
  400 Q%=FNin("Select 1, 2 or 3",1,3)
  410 IF Q%=1 THEN PRINT'"  R";
  420 IF Q%=2 THEN PRINT'"R^2";
  430 IF Q%=3 THEN PRINT'"1/R";
  440 INPUT" =      "C0
  450 INPUT"    + Y x "C1
  460 INPUT"  + Y^2 x "C2
  470 INPUT"  + Y^3 x "C3
  480 INPUT"  + Y^4 x "C4
  490 INPUT'"Preload file:"L$
  500 L%=(L$<>"")
  510 ENDPROC
  520 :
  530 DEF FNin(I$,U%,V%)
  540 REPEAT
  550 PRINT" "I$;TAB(22);
  560 INPUT": "W%
  570 IF W%<U% OR W%>V% THEN VDU 7
  580 UNTIL W%>=U% AND W%<=V%
  590 =W%
  600 :
  610 DEF PROCcreate
  620 PROCvdu
  630 Y%=-S%-A%
  640 r=0
  650 PROCrad
  660 PROCrad
```

Continued ▶

◀ Continued

```
  670 FOR Y%=-S% TO S% STEP A%
  680 PROCrad
  690 rs=R%*R%
  700 FOR X%=-R% TO R% STEP A%
  710 gx%=2.5+(RND(1)-0.5)*B+(X%+SQR(rs-
X%*X%)+v)*h
  720 GCOL 0,gx%
  730 PLOT 69,X%+H%,Y%+G%
  740 NEXT:NEXT
  750 VDU 7:ENDPROC
  760 :
  770 DEF PROCkeyin
  780 REPEAT
  790 key=GET
  800 IF key=83 THEN PROCsave
  810 IF key=49 THEN C%=(C%+1) MOD 8
  820 IF key=50 THEN D%=(D%+1) MOD 8
  830 IF key=51 THEN E%=(E%+1) MOD 8
  840 IF key=48 THEN F%=(F%+1) MOD 8
  850 PROCvdu
  860 UNTIL key=67 OR key=83
  870 ENDPROC
  880 :
  890 DEF PROCsave
  900 ?&2FFC=C%:?&2FFD=D%
  910 ?&2FFE=E%:?&2FFF=F%
  920 *SAVE SCREEN FFFF2FFC FFFF8000
  930 ENDPROC
  940 :
  950 DEF PROCload
  960 PROCoscli("LOAD "+L$+" FFFF2FFC")
  970 C%=?&2FFC:D%=?&2FFD
  980 E%=?&2FFE:F%=?&2FFF
  990 PROCvdu
 1000 ENDPROC
 1010 :
 1020 DEF PROCrad
 1030 oldr=r
 1040 y=Y%/S%
 1050 r=(((C4*y+C3)*y+C2)*y+C1)*y+C0
 1060 r=ABSr+1E-6
 1070 IF Q%=2 THEN r=SQRr+1E-6
 1080 IF Q%=3 THEN r=1.0/r
 1090 IF r<-1 THEN r=-1
 1100 IF r>1 THEN r=1
 1110 r=r*S%
 1120 h=SIN(ATN((r-oldr)/A%)+PI/2.0)/r
 1130 v=COS(ATN((r-oldr)/A%)+PI/2.0)/h
 1140 h=h/1.732
 1150 R%=r
 1160 ENDPROC
 1170 :
 1180 DEF PROCfile
 1190 CLS
 1200 REPEAT
 1210 VDU 26:CLS:*CAT
 1220 INPUT'"Enter name of screen file :
"L$
 1230 UNTIL LEN(L$)>0
 1240 L%=TRUE:M%=TRUE
 1250 ENDPROC
 1260 :
 1270 DEF PROCvdu
 1280 VDU 19,1,C%;0;19,2,D%;0;
 1290 VDU 19,3,E%;0;19,0,F%;0;
 1300 ENDPROC
 1310 :
 1320 DEF PROCoscli($oscli%)
 1330 X%=oscli%:Y%=oscli% DIV 256
 1340 CALL &FFF7:ENDPROC
```

Continued ▶

Voke's listing 1 continued

```
1350 :
1360 DEF PROCerr
1370 REPORT:PRINT" at line ";ERL''
1380 PRINT"Press Q to quit or any other
key"'"to continue."
1390 *FX 15,1
1400 key=GET OR 32
1410 IF key<>ASC"q" RUN
1420 CLS:END
```

Checksums

Checksums make a welcome return this month for Peter Voke's exciting 3 Dee graphics. Enter Peter's program and run it. If you cannot trace any error then use the checksums. To do this you will need the BSUM program provided in First Byte of August 1985. (Also on this month's disc and cassette as a bonus.)

*Alternatively, the UserROM (see page 102) contains the checksum routine as a star command, ie *CHECK.*

Line no	Checksum
10	1736
20	1495
30	752
40	2249
50	63
60	1401
70	976
80	250
90	328
100	804
110	323
120	927
130	537
140	1254
150	1675
160	796
170	455
180	63
190	1059
200	701
210	645
220	1297
230	888
240	1735
250	1867
260	1953
270	498
280	1540
290	1066
300	224
310	2102
320	2096
330	2059
340	2643
350	2613
360	224
370	2237
380	3048
390	3096
400	2084
410	1269
420	1350
430	1303
440	684
450	911
460	992
470	994
480	996

Continued ►

◄ Continued

Line no	Checksum
490	1691
500	572
510	230
520	63
530	1174
540	250
550	863
560	525
570	1629
580	1235
590	192
600	63
610	1136
620	585
630	512
640	230
650	561
660	561
670	1303
680	561
690	582
700	1300
710	2676
720	625
730	1045
740	539
750	618
760	63
770	1051
780	250
790	564
800	1657
810	1687
820	1681
830	1684
840	1692
850	585
860	1498
870	230
880	63
890	937
900	1129
910	1137
920	1940
930	230
940	63
950	922

Continued ►

◄ Continued

Line no	Checksum
960	2118
970	1129
980	1137
990	585
1000	230
1010	63
1020	816
1030	618
1040	486
1050	1861
1060	710
1070	1449
1080	1196
1090	1021
1100	931
1110	461
1120	2084
1130	2062
1140	580
1150	302
1160	230
1170	63
1180	922

Continued ►

◄ Continued

Line no	Checksum
1190	224
1200	250
1210	983
1220	2935
1230	770
1240	790
1250	230
1260	63
1270	840
1280	1325
1290	1329
1300	230
1310	63
1320	1746
1330	1960
1340	845
1350	63
1360	834
1370	1663
1380	4580
1390	439
1400	866
1410	1344
1420	508

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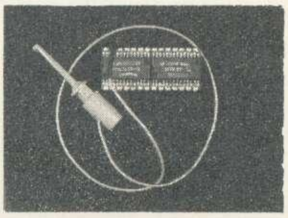
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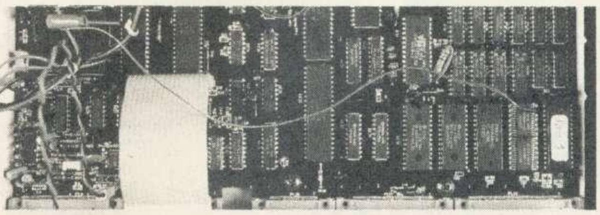
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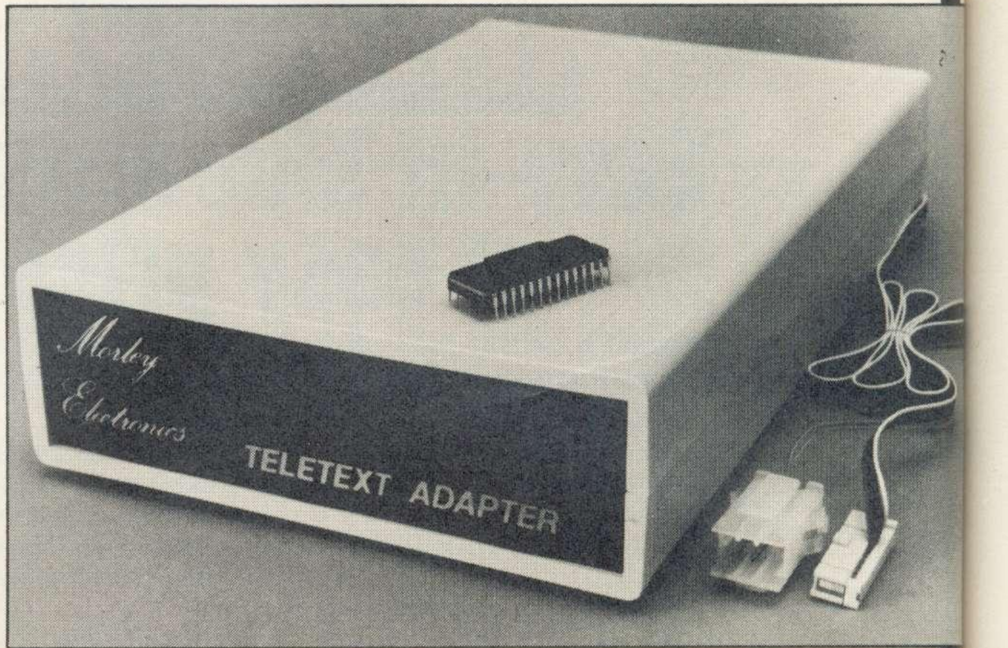
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ACORN FORUM

BBC, Electron, Master and Atom owners swap ideas under the auspices of Mike Barwise who continues his look at discs

DELVING INTO DISCS

In the first article in this series (March issue) only disc storage at file level was looked at. It was simply assumed that a file is saved to disc and an entry inserted in the catalogue.

Beyond the catalogue level, at which the catalogue parameters are translated into position information for the drive read head, is another, lower, level, at which the data are stored as pulses on the magnetic coating of the disc. An understanding of these levels of the storage process allow the user to cope with many interesting tasks, from recovery of corrupt discs to the creation of catalogue-free continuous data files. Many approaches to disc storage have been tried over the years, and inevitably some big companies have created industry standards. The most common in current use are IBM 3740 (single density) and IBM System 34 (double density). These are the systems to which the Acorn DFS conforms.

These systems specify the division of the disc tracks into sectors of four alternative lengths, with recommendations of the maximum sector count per track. Each sector is immediately preceded by a header block containing identification information about the sector and its contents. These headers are not available to the user except at machine level, but most floppy disc controller (FDC) chips have commands that allow them to be accessed in one way or another. More about the headers later, but first an explanation of the difference between single and double density.

The floppy disc rotates at a fixed speed of 300rpm (revolutions per minute). The innermost (shortest) track (track 39 or 79) is on a minimum radius of 1.3438 inches, making it 8.44 inches long.

Just as with tape recorders, there is a maximum frequency of signal which can be recorded properly on the magnetic coating. This is measured in bits per inch (bpi), with the maximum allowable figure in the region of 5500-5600 bpi. To keep the quantity of data per track constant and to maintain reliability, the shortest track length is multiplied by this bpi value, giving about 46,000 bits per track.

As there are eight bits per byte, the bits per track figure imposes an upper limit of about 5700 on the number of bytes which can be stored on a track. In practice, the figures have been adjusted somewhat to provide a convenient byte transfer rate into and out of the FDC. At single density, this is one byte every 64 microseconds, and at double density it is one byte every 32 microseconds.

The two systems yield maximum byte counts of 3125 (single density) and 6250 (double density) per disc track. Therefore, double density stores twice as many data bytes per track as single density, and stores them twice as fast, but the bit density is the same.

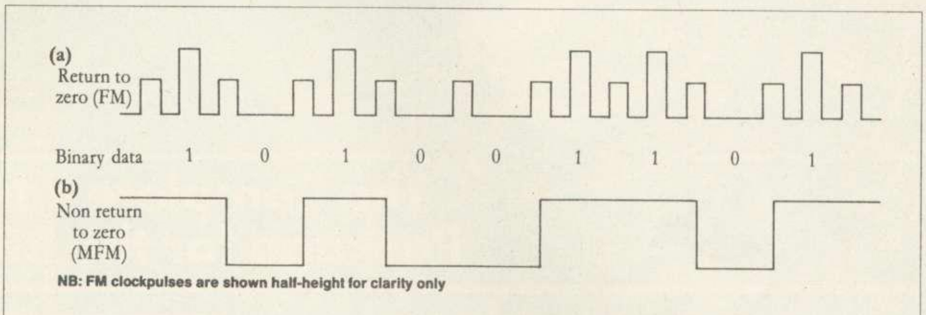


Figure 1. Comparison of frequency modulation (a) and modified frequency modulation (b)

How does this happen? It's really quite simple. Single density storage causes a constant regular stream of pulses (clock bits) to be stored on disc. These are stored at half the chosen bit density, and every time a data bit is a one, it is stored additionally between two clock bits (see figure 1a). This is called 'return to zero' recording, as the quiescent state is the zero level, and pulses are actively created to indicate ones. During read-back, the FDC is synchronised to the stream of clock bits. It reads zeros in the absence of data bits, and ones when it finds them. RTZ is an inherently reliable system, as drive speed variation, which is the biggest single problem in disc systems, can be constantly adjusted for according to the frequency of the clock bits. However, there is a penalty to pay: half the potential bit positions on a disc track are occupied by clock bits, so actual data storage is about 50 per cent of theoretical maximum.

It occurred to some clever people at IBM that if they could get rid of the clock bits, they could double the data capacity of the disc. They came up with a system called 'non-return to zero' or NRZ (figure 1b) in which the only information recorded on the disc is changes of

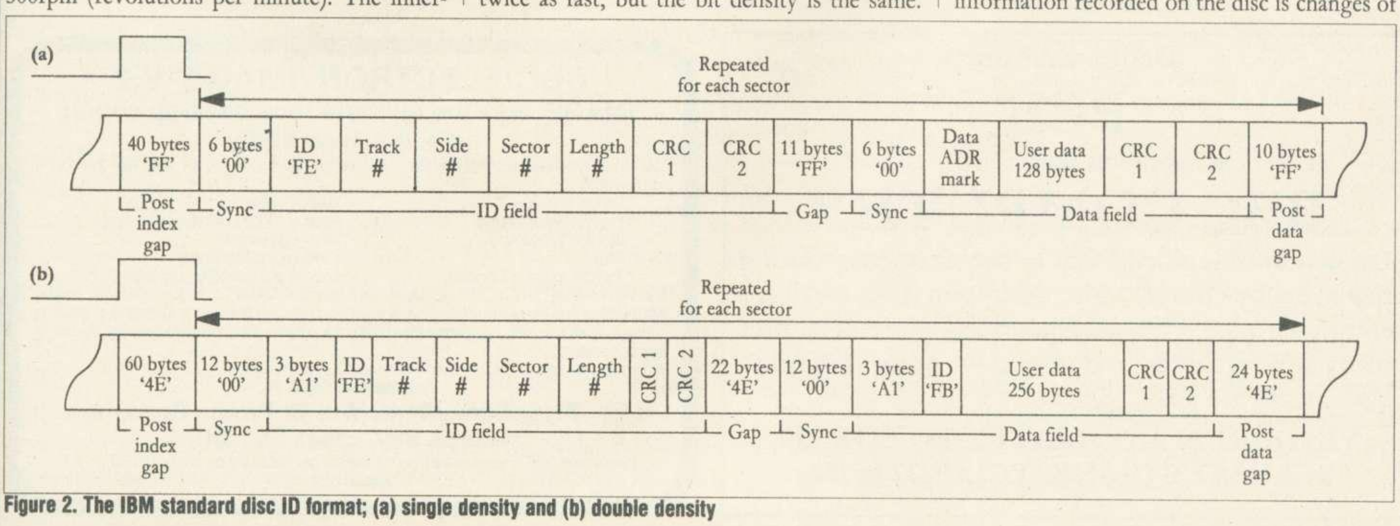


Figure 2. The IBM standard disc ID format; (a) single density and (b) double density

state between zeros and ones or vice-versa. Thus a continuous block of bytes (&FF) would be stored as a start pulse and then nothing more until a zero bit was stored. All bit positions on the disc are thus available for data storage, but the penalty is reliability.

As mentioned above, the major problem in disc systems is motor speed variations during writing and reading. Double density relies entirely on the disc passing under the head at a constant speed. The number of contiguous ones or zeros in a block of data is discriminated solely by the number of bit times (based on bpi and rotational speed) before the next recorded transition. Any speed differential between recording and reading will completely garble the data. In an attempt to compensate for this on the inner tracks where the data density approaches the maximum bpi, 'write pre-compensation' is introduced. This causes the data to be slewed a little in the time domain, so that delays in the signal path to the write head can be cancelled out.

The byte counts per track quoted above sound very impressive, particularly if you multiply them by the number of tracks on your disc. However, this is the often-advertised (in tiny upside-down print) 'unformatted capacity.' You cannot use all of it. Bytes have to be set aside by the formatting process to store the headers (referred to earlier) so the disc system knows what it is doing and where it is doing it. The user storage available per track is specified in the IBM standard as 2048 bytes (single density) or 4096 bytes (double density). The crafty people at Acorn actually managed to squeeze out 2560 bytes in single density (at only a very small reliability penalty and by using a little-publicised Intel specification), but as far as I know nobody has successfully exceeded the IBM double density figure.

When you format a disc, the micro sends a continuous stream of bytes to the disc at each head position (potential track). The byte stream consists of blocks of data (ID headers) interspersed by 'gaps' or null bytes and dummy data to fill what will be the data storage sectors. The IBM single and double density formats are shown in figures 2a and 2b. After the drive head is positioned, writing starts with an 'index pulse'. This is caused by the little hole in the disc moving past the bigger hole in the jacket in the line of fire of an optical sensor.

The 'post index' gap compensates for a drive which is rotating too fast during a write operation on the last sector of a track. The over-run would otherwise possibly corrupt the following ID header. The sync bytes are read by the FDC chip and are used to set up its internal 'phase locked loop' to synchronise the internal clock for reading of the ID header. Having synchronised, the FDC looks for the ID address mark. This is byte FE hex, and it does two jobs. First, it tells the FDC that what follows is a sector ID, and second, it initialises the FDC's internal CRC (cyclic redundancy check) generator so that it can verify that the header is not corrupt.

The following bytes are fairly obvious: track – 00 through 27 hex or 4F hex (they must start at 00 and be consecutive); side – 0 or 1, which is not used by Acorn systems (always 0); sector; and length. Length is not a literal value, but is coded as 0 through 3 for lengths of 128, 256, 512 and 1024 bytes per sector. This ID is followed by a two-byte CRC which includes all of the header except itself.

After the ID, there is another safety gap and sync block, followed by a 'data address mark'. This differs between single and double density, but does for the data sector what the ID AM does for the ID. It is immediately followed by the data sector and its CRC. Another safety gap lies between the data CRC and the sync bytes leading to the next sector ID.

£20

MORE HELP FROM MIRANDA

Miranda Hill from South London is a regular contributor to these pages and has sent in two more useful programs. The first is an automatic screen saving routine for use in modes 0, 1 and 2 (see listing 1). It allows programs to be saved to tape or disc whenever the CTRL and @ keys are pressed together. This is especially useful when running your own graphics programs which you may want to save screens from, perhaps to recall at a later date for dumping to a printer.

The machine code 'lives' in the cassette input buffer from &A00. This means it will be overwritten by any cassette load operation or by any input via the RS423 interface. If you need to use these facilities then simply adjust the value assigned to 'base' in line 100 before assembling. As it stands the screen will be saved under the filename SCREEN@ – this can be changed by amending line 130. Similarly, other screen modes can be catered for by adjusting the save addresses given in the same line. Alternatively, you could insert any other star command here, and it will be executed when CTRL-@ is pressed.

By altering the value assigned to the variable 'keynumber' in line 140 it's possible to change the CTRL function which saves the screen, eg, assigning a 1 will test for <CTRL-A>, a 2 will test for <CTRL-B>, etc. ADFS users will need to use SCREENA as the initial filename, as @ is not allowed.

To allow you to save several screens at one go the postfix after the filename SCREEN is incremented by one.

Miranda's second program (see listing 2) is an automatic printer lister – it automatically loads up to six programs and lists them to a printer. The program is a little 'illegal' in that it peeks the function key buffer – the side effect of this is it won't run on the Master.

```
   10 REM Acorn Forum -
   20 REM CTRL-@ screen save
   30 REM by Miranda Hill
   40 REM B/B+/E
   50 REM (c) Acorn User April 1986
   60 :
   70 oscli=&FFF7
   80 osbyte=&FFF4
   90 oswrch=&FFEE
  100 base=&A00
  110 string=base+&40
  120 pointer=base+&5F
  130 $string="SAVE SCREEN@ 3000 +5
000"
  140 keynumber=0
  150 FOR pass=0 TO 3 STEP 3
  160 P%=base
  170 [OPT pass
  180 .entry
  190 PHP
  200 CPY #keynumber
  210 BEQ dumpit
  220 PLP
  230 RTS
  240 :
  250 .dumpit
  260 TSX
  270 STX pointer
  280 LDA #30
  290 JSR oswrch
  300 LDA #13
  310 LDX #2
  320 JSR osbyte
  330 LDX #string MOD 256
  340 LDY #string DIV 256
  350 JSR oscli
  360 LDA #14
  370 LDX #2
  380 JSR osbyte
  390 LDA string+11
  400 CLC
  410 ADC #1
  420 STA string+11
  430 LDX pointer
  440 TXS
  450 PLP
  460 RTS
  470 ]
  480 NEXT
  490 PRINT"P%=&";~P%
  500 *FX 14,2
  510 ?&220=base MOD 256
  520 ?&221=base DIV 256
  530 PRINT'"<CTRL @> dumper instal
led"
  540 VDU 7
  550 END
```

Listing 1. Automatic screen saving routine

Entering the program is straightforward – just ensure there are exactly 84 asterisks directly following the function key assignment in line 70. Also ensure there are seven spaces between the quotes in lines 90 to 140.

The programs listed in the DATA state-

```
   10 REM Acorn Forum - Auto Lister
   20 REM by Miranda Hill
   30 REM B/B+/E
   40 REM (c) Acorn User April 1986
   50 :
   60 REM 84 stars follow
   70 *KEY0************************
************************************
************************|M
   80 REM 7 spaces between quotes
   90 *KEY2LO."       "|ML.|O|B|M|A
|L|C|M
  100 *KEY3LO."       "|ML.|O|B|M|A
|L|C|M
  110 *KEY4LO."       "|ML.|O|B|M|A
|L|C|M
  120 *KEY5LO."       "|ML.|O|B|M|A
|L|C|M
  130 *KEY6LO."       "|ML.|O|B|M|A
|L|C|M
  140 *KEY7LO."       "|ML.|O|B|M|A
|L|C|M
  150 DIM name 7
  160 N%=0
  170 REPEAT
  180 READ $name
  190 IF $name="***" THEN 250
  200 FOR M%=0 TO LEN($name)-1
  210 M%?(&B00+?(&B00+N%+2)+5)=M%?n
ame
  220 NEXT
  230 $(&B11+13*N%)="*FX138,0,13"+S
TR$N%
  240 N%=N%+1
  250 UNTIL $name="***"
  260 PRINT'"Lister installed!"
  270 VDU 7
  280 :
  290 DATA ***
```

Listing 2. Automatic printer lister

ments at the end of listing 2 will be the ones listed to the printer when f0 is pressed. Each program name may be up to seven characters long and the last one should be terminated by three asterisks – ***

£5 *SPEAK TO ME

Jonathan Temple of Beeston has been delving into the excellent *Speech!* program from Superior Software and has discovered some memory saving techniques. Jonathan writes . . .

Although useful for adding stress and intonation, the *SPEAK command can be tricky to use when working out phonemes. A simple way around this is to use *SAY <text> and then PRINT $&A00 to print out the phoneme equivalent, which can then be used with *SPEAK. &A00 is used as a buffer by *Speech!* for converting English input into its phoneme equivalent. With this information the pitch of the vowel sounds can then be changed as necessary.

Typing *SAY ACORN USER and then entering PRINT $&A00, will list AYKAORN YUXWSER and this can be used with *SPEAK, ie, *SPEAK AYKAORN YUXWSER.

If you convert all the *SAY commands to their *SPEAK counterparts you can afterwards shorten the actual *Speech!* program by over 2k, thus reducing it from 7680 bytes to around 5472.

To do this *LOAD SPEECH! into memory and then type:

*SAVE MINI! 5500+1560 6000

to save the shorter version.

What we have done is to erase the *SAY dictionary from the program as it is no longer required. All other commands work but needless to say *SAY would hang the machine up.

£5 LACY CHARACTERS

Michael Turner of Colchester has found a useful way of obtaining rock-steady mode 7 screen displays. Michael explains . . .

In the Advanced User Guide are instructions for turning off the interlace in mode 7. This is given as follows:

VDU23,0,8,&90;0;0;0,23,0,9,&09;0;0;0

and is of course the mode 7 equivalent of *TV0,1. The AUG also points out that mode 7 is not supposed to be used un-interlaced: if you type in the above you get a most peculiar character set displayed. However, what it doesn't tell you is that if you then produce double-height characters, these letters are displayed in their normal double-height shapes.

Thus you can use mode 7 for such things as menus, and have a rock-steady display too, as long as any printing on the screen is done in double-height letters.

£10 DON'T INTERRUPT THE MUSIC!

The sound compiler presented in the May 85 issue of *AU* certainly struck a chord with Dutch Beeb fanatic Mark de Weger.

Mark has reworked the program so that it will convert a tune of your programming into an interrupt-driven one, which you can play while you work.

The techniques are particularly well-suited for use with games or indeed while any piece of software is loading in and setting itself up. The program is shown as a single listing (listing 3) – obviously once you have finished with the compiler section you can get rid of it.

Once the sound has been compiled you can save it as a data file. To do this enter the following line:

1720 PRINT "*SAVE DATA";
~block%;" "; (!&82 AND &FFFF)

```
   10 REM Music while you work
   20 REM Mark de Weger
   30 REM BBC B/B+/M/E
   40 REM (C) Acorn User April 1986
   50 :
   60 PROCassemble
   70 PROCdemo
   80 END
   90 :
  100 DEF PROCassemble
  110 DIM code% 210
  120 block%=&3000
  130 osword=&FFF1
  140 FOR pass%=0 TO 3 STEP3
  150 P%=code%
  160 [OPT pass%
  170 .intercept
  180 LDA &20C
  190 STA &80
  200 LDA &20D
  210 STA &81
  220 LDA #(newword MOD256)
  230 STA &20C
  240 LDA #(newword DIV256)
  250 STA &20D
  260 LDA #(block% MOD256)
  270 STA &82
  280 LDA #(block% DIV256)
  290 STA &83
  300 RTS
  310 \
  320 .newword
  330 CMP #7
  340 BNE ow
  350 PHA
  360 TYA
  370 PHA
  380 STX &84
  390 STY &85
  400 LDY #0
  410 \
  420 .copypar
  430 LDA (&84),Y
  440 STA (&82),Y
  450 INY
  460 CPY #8
  470 BNE copypar
  480 LDA &82
  490 CLC
  500 ADC #8
  510 STA &82
  520 BNE exit
  530 INC &83
  540 LDA &83
  550 CMP #&80
  560 BEQ stop
  570 \
  580 .exit
  590 PLA
  600 TAY
  610 PLA
  620 \
  630 .ow
  640 JMP (&80)
  650 \
  660 .stop
  670 PLA
  680 TAY
  690 PLA
  700 \
```

Listing 3. **Continued on page 127**

The program includes a short demo routine. Once this has stopped playing you can turn the interrupt sound on and off using the function keys f0 and f1.

As Mark says, you could use his program (to very good effect) with Joe Telford's music program (MULE) from the November 1985 issue of *Acorn User*.

```
710 .restore
720 PHA
730 TYA
740 PHA
750 LDA &80
760 STA &20C
770 LDA &81
780 STA &20D
790 LDY #1
800 LDA #&F0
810 STA (&82),Y
820 PLA
830 TAY
840 PLA
850 RTS
860 \
870 .sound
880 STX &70
890 STY &71
900 STX &72
910 STY &73
920 RTS
930 \
940 .makesound
950 \Exit if not vsync
960 PHP
970 CMP #4
980 BNE end
990 PHA
1000 TXA
1010 PHA
1020 TYA
1030 PHA
1040 LDY #0
1050 \
1060 .block
1070 LDA (&70),Y
1080 STA &80,Y
1090 INY
1100 CPY #8
1110 BNE block
1120 LDA #&FB
1130 SEC
1140 SBC &80
1150 TAX
1160 LDA #128
1170 LDY #&FF
1180 JSR &FFF4
1190 CPX #0
1200 BEQ bend
1210 \End of tune?
1220 LDA &81
1230 CMP #&F0
1240 BEQ again
1250 LDA &71
1260 CMP #&80
1270 BEQ again
1280 \Make sound
1290 LDA #7
1300 LDX #&80
1310 LDY #0
1320 JSR osword
1330 LDA &70
1340 CLC
1350 ADC #8
1360 STA &70
1370 BCC bend
1380 INC &71
1390 \
1400 .bend
1410 PLA
1420 TAY
1430 PLA
1440 TAX
1450 PLA
1460 \
1470 .end
1480 PLP
1490 RTS
1500 \
1510 .again
1520 LDX &72
1530 STX &70
1540 LDY &73
1550 STY &71
1560 JMP bend
1570 ]
1580 NEXT pass%
1590 ENDPROC
1600 :
1610 DEFPROCdemo
1620 CALL intercept
1630 FOR L%=0 TO 255 STEP 4
1640 SOUND0,-4,L%,3
1650 SOUND1,-15,L%,3
1660 SOUND2,-15,L%,3
1670 SOUND3,-15,255-L%,3
1680 NEXT L%
1690 CALL restore
1700 :
1710 X%=block% MOD 256
1720 Y%=block% DIV 256
1730 CALL sound
1740 ?&220=makesound MOD 256
1750 ?&221=makesound DIV 256
1760 :
1770 *KEY0 *FX14,4|M
1780 *KEY1 *FX13,4|M
1790 ENDPROC
```

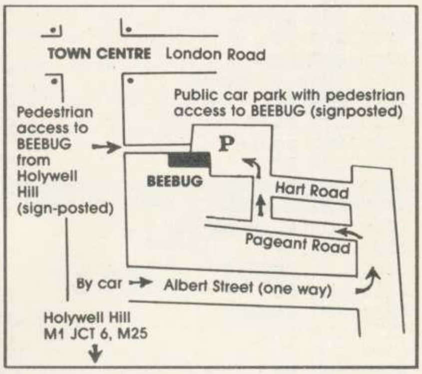
Listing 3. Converts a tune of your programming into an interrupt-driven one, which you can play while you work

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COMPUTERS

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BBC B+
There are still limited supplies of these machines available at special prices. Please contact us for our stock situation & current prices.

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0200	BBC Master 128 Micro	**499.00**
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0206	Acorn Teletext Adaptor	**144.00**
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0661	25 × 48tpi SS DD Discs + Free Box	**33.90**
0662	25 × 48tpi DS DD Discs + Free Box	**45.19**
0663	25 × 96tpi SS DD Discs + Free Box	**45.19**
0664	25 × 96tpi DS DD Discs + Free Box	**48.90**
0665	50 × 48tpi SS DD Discs + Free Box	**58.30**
0666	50 × 48tpi DS DD Discs + Free Box	**81.40**
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SOFTWARE

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"ROMIT" is an Official Ram Filing System (RFS). It allows you to use sideways RAM or even user RAM to produce ROM versions of your programs. You can use it as a printer buffer or as a 16K "Silicon Disc". Send for our BEEBUGSOFT software catalogue for full details.

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1001	Acornsoft VIEWSHEET Spreadsheet ROM	**53.00**
1002	Acornsoft HI-VIEW ROM & Disc	**55.00**
1019	Acornsoft VIEWSTORE Database ROM	**53.00**

SOFTWARE

Code	Description	Price inc. VAT
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1014	VIEW Printer Driver Generator Disc	**11.50**
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1020	AMX Paint Pot Disc	**13.45**
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1102	C.C. Wordwise ROM	**35.00**
1100	C.C. Wordwise Plus ROM	**51.50**
1112	C.C. Hi Wordwise Plus Disc	**5.75**
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Colour Monitors
The Phillips CT2007 and CT1114 14" TV/RGB Monitors continue to be very popular and the Microvitec RGB Monitors are, of course in great demand.
To take the place of the discontinued Sanyo 3115 Ultra High Resolution Monitor, Beebug are pleased to announce the TAXAN SUPERVISION 3, a 12" Monitor which, using state of the art technology, produces quite astonishing resolution and clarity.
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0500	Taxan 1201 12" Green, Short Persist.	**103.50**
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PRINTERS

Letter Quality
The Brother HR15 printer has easily changeable printwheels and will accept sheet feeders, tractors and even a keyboard! At the budget end of Letter Quality is the Ibico LTR1 at just £138.00.

Colour Printers
The CANON PJ1080A Full Colour printer still surprises everyone with the clean, almost dot-free printout. It does not need special paper and is perfect for Graphics Freaks! The Epson JX100 is ideal for both coloured listings & documents and graphics dumps.

NLQ Matrix Printers
Both the Epson LX80 and the Taxan KP810 offer a Near Letter Quality printing mode. We now stock the amazing "Fontaid" package for the Taxan which gives you at least an extra 8 NLQ fonts. An extra disc provides even more, including Script and handwriting fonts and even 24cpi fonts!
NOTE: "Fontaid" needs a RAM chip (our code 0707) fitted to the Taxan printer.

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0301	Canon PW1080A 10" NLQ Matrix	**340.00**
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0303	Canon PW1080A 10" Full Colour	**460.00**
0304	Epson LX 80 NLQ Matrix	**270.00**
0313	LX 80 Tractor Feed Unit	**23.00**
0305	Epson RX100	**392.00**
0307	Epson FX100	**490.00**
0308	Epson JX80 Colour	**569.00**
0309	Ibico LTR1 Print Band Printer	**138.00**
0311	TAXAN KP810 NLQ Matrix	**263.35**
0312	Linear Graphics Plotmate	**333.50**
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0401	2m BBC — Centronics Printer Lead	**10.00**
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0413	Ribbon for Epson LX80	**5.50**
0405	Brother HR15 Replacement Printwheel	**20.50**
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0415	Colour Ribbon for Epson JX80	**14.95**
0419	"Fontaid" ROM & Disc 40T	**30.00**
0420	"Fontaid" ROM & Disc 80T	**30.00**
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0452	"Real A4" W/P Paper 80g 2000	**28.75**
0453	2-part NCR Listing Paper 2000 sheets	**23.00**

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ROMS & RAMS

Our 7274 8K EPROMs are still just £2.30 and the 27128 16K version is £3.45.

"Shadow" RAM to increase user memory in Modes 0 to 6 can be added with the ARIES B23 RAM Board. The Watford 32K RAM card can sit inside the Beeb together with most ROM expansion Boards. Remember Beebug's special price of £39.00 for the ATPL Sidewise ROM board. A version for the B+ is now available at £29.00.

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0700	Aries B20 RAM card	**86.50**
0701	Aries B32 RAM card	**91.00**
0702	Watford 32K RAM card	**69.00**
0703	AMX Mouse	**79.95**
0704	ATPL Sidewise ROM Board for Model B	**39.00**
0735	ATPL Battery Backup Kit	**17.00**
0746	ATPL Sidewise ROM Board for B Plus	**29.00**
0705	2764 8K EPROM	**2.30**
0706	27128 16K EPROM	**3.45**
0707	6264 8K RAM	**4.00**
0708	EPROM Extractor Tool	**5.00**
0709	EPROM Eraser (UV)	**32.20**
0710	Soflite EPROM Blower	**75.90**
0711	Pace Nightingale Modem	**120.00**
0712	Pace Commstar ROM & Manual	**33.00**
0713	2 into 1 Phone Adaptor	**6.32**
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BUSINESS

NEWS

Ground rules for upgrades

The options facing owners and potential owners of BBC micros are frightening and bewildering. In this issue we hope to narrow the choices and give you some ground rules to work by.

But remember, the important thing is whether the cash spent will really save you money. Too many people become bogged down in computing, rather than actually using micros.

As can be seen in this issue, just what the 512 will offer is as yet unclear. And the exact level of software support – which will be the deciding factor for many people – is unlikely to be known until the machine appears.

Software guess for 512

by David Kelly

Acorn's Master 512 can run a bewildering range of operating systems, but what this will mean in terms of ready-to-run software is far from clear.

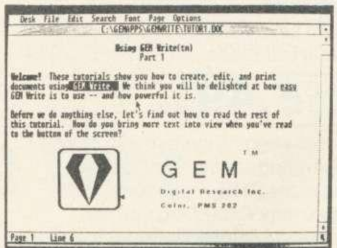
The machine, which uses an extra microprocessor in the same family as that in the IBM PC, is to differing extents compatible with software written to run under GEM, CP/M86 (which is the 16-bit version of CP/M), MS-DOS and IBM's PC-DOS.

Of the four operating systems, PC-DOS is by far the most established, with a library of well over 1000 programs.

From a hardware point of view, though, the machine is not an IBM copy, or 'clone'. According to Acorn's David Bell: 'We never set out to produce IBM-clone hardware, but the Master 512 is not aimed specifically at the business market – it is a more general machine than that.'

Since the Master is not an IBM clone, software written under any of the operating systems will have to be 'well behaved'; that is, it must be entirely hardware independent before it will run on the Master 512. This situation is similar to Acorn's own rules on 'legal' software – but the best progams are always illegal.

GEM has been designed to be a portable operating system so software written under it should run directly on the Master 512. It is, though, a young operating system, and there is so far little software written for it.



GEM: should run on the 512

However, the position with MS-DOS 2.1 and CP/M86 from Digital Research is quite clear-cut. The majority of applications are 'well behaved' and should run unaltered on the Master 512. 'Around 95 per cent of MS-DOS applications will run on the Acorn', said Digital's European vice president Paul Bailey.

The problem for the Master is with PC-DOS programs which make direct calls to the IBM's hardware.

Explained Paul Bailey, 'The effects of such calls are very unpredictable but a significant proportion of PC-DOS programs are unlikely to run on the Acorn.

'If I was being conservative I would say maybe as many as 50 per cent of PC-DOS applications will not run on the Master 512, and these programs include Lotus *123*, *Symphony* and Ashton Tate's *Framework*.'

Now both Digital and Acorn are trying to establish a list of 'qualified' programs – those PC-DOS programs which will work directly on the Master 512.

Acorn's David Bell confirmed that a list of qualified programs was in preparation and added, 'Where it is commercially justified we will also be specifically converting some not-so-well-behaved programs to run on the 512.

'But these need not necessarily be business titles. I would emphasise that we are intending to build a sensible range of titles as much for the educational area as for the business field.'

A precedent for a similar hardware configuration has been set by a machine from Philips in Austria, called the :Yes. This machine runs DOS Plus and, like the Master 512, is not an IBM PC clone. Philips has so far produced a list of 100 compatible titles. Said one member of Philips' technical team, 'Titles like *Symphony* and Lotus *123* will not run and cannot be easily converted. *DBase II*, *Wordstar* and *Logistix* (a similar package to *123*, written by Grafox) will run immediately and DBase III and Ashton Tate's *Framework* can be relatively easily converted'.

Pear Tree accounting on the Beeb

Pear Tree systems has taken its Main Business suite of accounting software, which was written for its repackaged BBC B+, the KBL128 PC (see the review by Roger Carus on page 173 of this issue), and put it out on disc for the BBC model B.

The menu-driven suite of fully-integrated packages includes packs for stock control, customer database, purchase ledger, suppliers' database, sales ledger, nominal ledger, invoicing and credit notes, proforma quotations, as well as bank account analysis and petty cash control.

The software is compatible with all disc filing systems on the BBC but requires 20k of shadow RAM to run. It will therefore run on a BBC B+ or Master. Owners of the 32k BBC model B need an additional 20k sideways RAM board, such as the Aries B20 or B32 or Watford Electronics' 32k RAM board.

The complete suite of business packages is available on one disc for £99 including VAT and p&p.

Training courses for Beeb owners

The Microcomputer Advisory Centre at the South Bank Polytechnic in London is planning a number of special training courses for BBC micro owners. All courses last two days and enrollment costs £140 per course.

Introduction to Microcomputing: 13-14 May and 17-18 June. Databases and Information Retrieval: 11-12 May and 1-2 July. Wordprocessing and Computing for Publishers and Authors: 6-7 May. Microcomputers for Training: 22-23 April and 8-9 July.

More details from Microcomputer Advisory Centre, Polytechnic of the South Bank, Borough Road, London SE1 0AA.

Video on comms

Computer Television has produced a video which aims to explain data communications to the confused businessman.

Data Communications Made Easy asks what hardware and software is needed by a company considering taking the plunge, and what the possible benefits are.

Some prior understanding of the subject is assumed, but the video is not aimed at the technically-minded. It runs for 50 minutes and costs £90 in VHS or Beta format, or £100 for U-matic. Postage and packing is £2.50 extra.

Also from the same company is the self-explanatory video, Selecting Business Software the Easy Way, which covers wordprocessing, accounts, graphics, financial modelling, databases, as well as integrated packages. It runs for an hour and costs £39.95 in VHS or Beta, or £49.95 in U-matic. Postage and packing costs £1.50.

The company is currently working on a video called Technology for Profit.

Contact Computer Television, 9 Cavendish Square, London, W1M 0DU. Tel: 01-580 6363.

'Today' goes on-line

Today, the new daily newspaper set for launch this month by Eddie Shah's News UK Group is to be made available on-line to BBC micro owners via the World Reporter database.

Like the other newspaper publishing giants, News UK is actively getting involved in electronic publishing and the highly automated method of production lends itself to exploitation via a world-wide database network.

Even though access to the big databases like Datasolve's World Reporter is, by domestic prices, quite expensive – typically around £50 an hour to access the system – there is no difficulty in hooking up a BBC computer through a modem.

All the major databases understand the communications protocols used by the main BBC micro modems, namely, 300/300 baud and 1200/75 baud.

The Datasolve World Reporter database now holds the complete texts of each issue of an increasing number of national and international newspapers, journals and agencies, including the *Financial Times, Washington Post, Guardian, Economist, New Scientist,* Associated Press, the Soviet news agency Tass as well as a summary of BBC world broadcasts.

The database offers a full search facility and even though the system already contains over 500 million words, because it is run on Europe's largest computer facility, the response time is only a couple of seconds.

There is no subscription fee for World Reporter; instead access time is charged at the rate of £60 per hour.

Robert Maxwell, owner of Mirror Group Newspapers, is also expanding the scope of his Pergamon Infoline on-line information system. Forty separate databases now contain a huge library of information covering the business, technical and scientific areas. Again the systems can be accessed by any BBC micro with a 300/300, 1200/75 or 1200/1200 baud modem.

Costs to access the various data banks vary but typical entry costs are between £50 and £125 an hour. Among the major information providers to Infoline is company data suppliers Dun and Bradstreet. Its Who Owns Who database can be accessed at £125 per hour.

Key British Enterprises, another section, costs £65 an hour.

Upgrades to View

Acorn has released details of the procedure by which owners of *View* 2.1 can upgrade to *View* 3.0

Even though the earlier versions of *View*, which are still available in many shops, will not run on the BBC B+, Acorn has decided to charge around £45 for the full upgrade.

If you want to upgrade either from a 1.4 or 2.1 ROM or a *Hi-View* disc the procedure is as follows:

Send off your present disc or ROM, together with a cheque to Acornsoft for £23 and you will receive a new *View 3* ROM plus key card and reference card.

The *View 3* manual costs a further £10, showing how to use the additional features of the new version, and the upgrade does not include the printer driver routines normally supplied with *View 3.* These are, though, available separately for a further £11.50 (disc) or £9.95 (cassette).

Version 3.0 of *View* offers a number of improvements over its predecessors.

New features include those of being able to turn page-break off and being able to rename a file before searching.

The formatting is easier to use and a number of bugs in the earlier versions have been identified and corrected.

BUSINESS TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Speech	Superior	£9.95	£11.95	—	—	—	—	Yes
2	Mini Office	Database	£5.95	£7.95	—	£5.95	*	*	
3	Personal Money Management	Acornsoft	£11.90	—	—	—	—	—	—
4	Wordwise	Computer Concepts	—	—	£46	—	—	—	—
5	Paintbox	Audiogenic	£9.95	—	—	—	—	—	—

Compiled by Gallup/MicroScope. Contact publisher: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale RG7 4AA. Tel: (0734) 303663. Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Superior Software, Regent House, Skinner Lane, Leeds 7. Tel: (0532) 459453. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. (0442) 63933. Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

EXPANDING HORIZONS

To kick off this five-page special, here's an overview of the upgrade options open to your business with the pros, cons and costs weighed up

Bruce Smith

There are undoubtedly huge advantages in using a micro to help run your affairs, whether it's a part time occupation or something you earn your livelihood at (and perhaps supply others with theirs as well).

But what equipment should you choose to help you? Is it worth adapting your existing system? Should you buy something that is completely custom made? Or should you forget the whole idea? These questions are the most obvious, but are not easy to answer without a reasonable knowledge of what's going on in the marketplace. With new machines and systems arriving in a never-ending stream, keeping track can be difficult. Your final choice will probably depend on what equipment (if any) you already own and how much cash you have to spend.

It can hardly have escaped your notice that January saw the launch of the Master series of BBC micros and the question everybody's asking is 'is it worth it?' My own view is a definite 'yes!'.

Running any business profitably needs reliability, efficiency and ease of use. That sentence sums the Master up. There is a huge base of software already available, more than 18,000 items according to Acorn's calculations, that will run immediately. The bottom line for software and ROMs is that if they are written following the guidelines laid down by Acorn, ie, legally, they will work.

One of the biggest problems with compatibility is that disc-based software often uses 'illegal' protection, so while the software may be compatible, the protection won't let you load it. Many software houses have upgraded their products so that they now work – *Wordwise Plus*, for example. If the software works on the BBC B+ it should run on the Master. Beware of software being sold off cheaply, as it could be old stock that won't work – the only way of knowing is to test it.

Hardware – including monitors, disc drives, printers and modems – will all work and present no problems: just make sure any support utility software supplied is compatible.

If you are looking for a micro to which you can add existing monitors, disc drives, printers, etc, the Master is the one. Remember, it comes fitted with an excellent wordprocessor, *View 3*, a flexible spreadsheet in *ViewSheet* and communications software that allows you to drive your modem immediately, giving instant access to information systems around the world. The only thing missing is a database – I highly recommend *ViewStore*, which you or a dealer can fit in a matter of minutes.

The cost of the Master 128 is £499, which includes VAT. This is reclaimable if you are VAT registered, so the cost comes down to £433. Remember the bundled software would cost you almost £300 if bought separately.

Should existing BBC micro owners upgrade? First, what software do you already have? If you have either the *View* or *Inter* family, and possibily a 6502 second processor, you have already made a large investment. Here the case is a little less clear. Certainly, if you can afford it then the upgrade is worth it – remember, you can use the 6502 second processor with the Master. As above, VAT is reclaimable and you can offset the price of a new micro against your tax liabilities.

Also, if you've invested time and effort in learning a piece of software, make sure it works on a Master before upgrading.

If cash is tight then it's probably not worth proceeding at this stage. If, on the other hand, you need to upgrade an existing BBC micro to contain a wordprocessor, spreadsheet, communications software and filing system, the cost of buying a Master would be well worth it. Of course, if you do upgrade to a Master you can find a good home for your Beeb by selling it through the Free Ads page in *Acorn User* – expect to get about £200 to £250 for it.

Your existing equipment may make it financially more viable for you to stick with it and so go along another route. For example, you may already have a BBC micro with 6502 second processor. In this case it would be more sound to invest about £150 in some software.



The Master: 'reliable and efficient'

There are two obvious choices – the *View* family from Acornsoft or the *Inter* family from Computer Concepts. Both are excellent suites of software and are a credit to their respective companies. Roger Carus has covered these areas extensively and I suggest you read his article (page 139) in this issue, plus that in the January 1986 issue of *AU*.

Acorn possibly has the edge in that its packages are all readily available, and include extra items such as *ViewSpell* and *ViewIndex*. Computer Concepts' *InterWord* and *InterBase* have yet to appear. However, a preview of *InterWord* shows that it will be to the usual high standards, and includes pull-down menus.

If you can afford the time I think it would be worth waiting to see the final versions before making a choice. In any case, stick with one family or the other, so ensuring complete compatibility and integration.

If you already have your suite of software, but don't have a second processor, is it worth the cost? A difficult one to answer, this, as you'll be paying £199 inc VAT to obtain some

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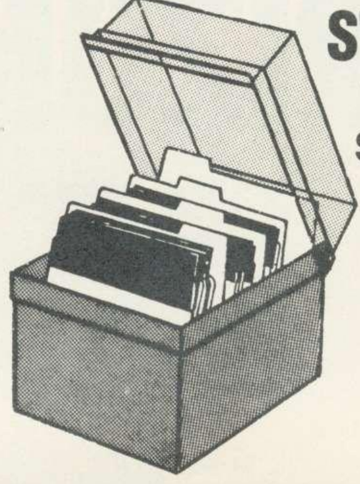
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extra memory. However, you will probably not gain any extra memory advantages when using a spreadsheet package, ie, *ViewSheet*. Certainly the memory gain is much more dramatic with a wordprocessor and a database. All in all, the cost versus gain argument is not as clear cut and needs some deep thought.

Shadow RAM boards are a cheaper alternative, but they don't provide you with extra usable programming memory in the normal sense. What they do is to free the memory normally used to display the screen. This in effect means that you can work in a high resolution screen mode, ie 80 column, at all times with no reduction in usable memory. The market leaders here are the Aries B32 and Watford Electronics 32k boards and a review of them will be appearing in a future issue.

The Z80 second processor seems to have attracted business users to it, but if you are looking along these lines then don't unless you are committed to, and familiar with, the system. The software supplied with it is old, obsolete and incapable of using any of the new technology such as dot matrix printers. The Acorn/dealer support for the Z80 is virtually non-existent. You have to rely on the CP/M user group and magazines, which are bound to reduce the amount of support they can give as they have to devote space to new machines.

Cost comparison is important, though, and the table on the right should give you some indication of how far you can go for a particular price, although business circumstances will be the deciding factor – see Roger Carus' article in the February 1986 issue.

If you are not technically orientated and want the minimum of fuss when setting up your system, the KBL128 PC from Pear Tree Computers could be worth considering. This offers you a complete package based around the BBC B+ 128k for £1679 inc VAT. Included in the price are a high resolution monochrome monitor, an IBM compatible infra-red keyboard, the computer fully cased with dual disc drives, an Epson LX80 printer and the Advanced Disc Filing System. Perhaps an even bigger advantage is the bundled business software supplied. The system is reviewed on page 173 by Roger Carus and I refer you to this for more information.

Returning to the Master series of computers, the Turbo and 512 upgrades also bear consideration. Both are boards which provide extra features and plug inside the Master's case. Turbo is, in effect, a very fast second processor. It has the same advantages as the standard 6502 second processor, but is supplied with extra software, some of which allows you to use the Master memory as a printer buffer. For instance, you can print out very long documents while using the Master for normal wordprocessing.

The 512 runs the very popular GEM and DOS Plus operating system, which Simon Williams discusses on pages 141 and 143. The main advantage of running GEM and DOS Plus is that it should give you access to many software packages written to run on any machine using GEM and or DOS Plus but how compatible this is remains to be seen, of course. Ultimately it will be best to wait and see what will run and indeed who is going to support it. Of course, the Master 512 is not yet available but this may have changed by the time you read this article. On the other hand Torch has been supplying an IBM compatible upgrade for the BBC micro for over a year and a half. Called the Graduate, this upgrade gives a very high degree of IBM compatibility – not just MS-DOS compatibility – and it costs £499. If cash is tight, you can go the second hand route. The Free Ads at the back of *AU* invariably contain often new equipment offered at reasonable prices and it's worth looking there. I suspect that the number of Beebs for sale will increase as people upgrade to Masters, so watch out for bargains.

What price an upgrade?

Assume you have a standard BBC B micro fitted with a disc filing system (DFS), the *View* wordprocessor and *ViewSheet*. You want to add *ViewStore*, the Advanced DFS and shadow memory to your system.

There are two hidden costs. First, you will need a ROM extension board to allow you to fit *ViewStore*, as your three existing spare ROM sockets are full. Second, you will need to fit the 1770 disc interface board to allow you to run the ADFS. The approximate cost of these items inclusive of VAT is:

ViewStore	£51
32k shadow RAM	£69
ROM board	£51
1770 interface	£49.50
ADFS chip	£29.50
Total cost	**£250**

If you sell your BBC B you can expect to get about £200. Offsetting this against the cost of a Master 128 means your effective payment is £299. This leaves a difference of just £49 between the cost of a Master and what you could spend upgrading your system to meet your needs. Remember that you are also getting a whole host of extras as well.

Conclusion

In summary, if you already have a large system which includes a second processor and a family of software then upgrading to a Master is of limited use and should only be considered if you want to extend your office system and perhaps take advantage of GEM and DOS Plus at a later date.

If you have a model B with perhaps just one or two of the packages discussed above then buy a Master and sell your BBC micro.

If you have a B+ or B+ 128k and want *View*, ADFS, *ViewSheet* and some communications software, again invest in a Master and offset the cost by selling your original micro.

For a simple calculation which shows how much the upgrade would cost, see the panel (left). Just total the cost of the software and hardware items which are supplied with the Master, and subtract them from the cost of the Master. You can subtract a further £200 if you plan to sell your existing Beeb – this leaves you with the effective purchase price.

Ready Reckoner

Item	Price inc VAT
View 3	£ 79.35
ViewSheet	£ 47.15
ViewStore	£ 51.00
Termulator	£ 28.75
Basic Editor	£ 29.50
Graphics ROM	£ 26.00
InterSheet	£ 48.30
InterWord	tba
InterBase	tba
Sideways RAM (16k User RAM)	£ 38.50
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1770 upgrade	£ 49.00
Numeric pad	£ 69.95
64k RAM upgrade	£ 40.25 (B+ only)
Turbo SP	£125.00
6502 SP	£199.00
Z80 SP	£344.00

The cost of your likely upgrades are listed above so you can do your own calculations to see how much a particular upgrade would cost you. See the box below for more details.

Remember, a Master 128 is the equivalent of a BBC B+ with a 64k upgrade (ie, now BBC B+ 128k), plus 3.5k extra main memory, *View*, *ViewSheet*, *Termulator*, *Graphics Extension ROM*, a Text Editor, Advanced Disc Filing System, numeric keypad, battery backed RAM, and cartridge slots.

In terms of a standard BBC B the Master is all of the above, plus shadow RAM and a 1770 disc upgrade kit.

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CLIMBING THE UPGRADE LADDER

Should you upgrade your Beeb, and if so, how? Here are the facts and figures to help you choose

Roger Carus

If you use a BBC model B for business purposes you will have become aware of limitations and are probably wondering what you should do about them, and whether some of the new developments would give you a better service.

Before spending any more you should be careful as you've already invested time as well as money: software is frequently improved upon so you may only get a temporary benefit from any change and the cost of alterations can be quite high; you want to choose the cheapest effective solution.

Why upgrade?

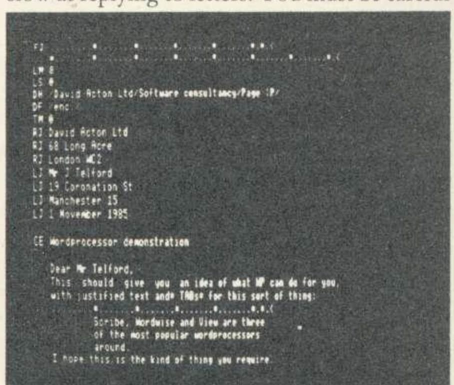
Why might you want to upgrade your system? Your business may have grown so your database no longer holds enough customer records or your accounting system may be unable to keep track of all your transactions: in either case you probably need more storage capacity. This is mainly a problem of hardware (probably involving new disc drives), although a double density DFS, such as Acorn's ADFS or the Watford DDFS, may be enough at a fraction of the cost.

You may have made mistaken choices when you first set up, or the system may have become obsolete, making it inconvenient to use. A good example of this is the way *Wordwise Plus*, with editing in 40 column mode, is now unsuitable because it is slow and tiring for skilled typists. In this case exchanging the ROM for the new *InterWord* with 80 column mode and permitting much longer documents provides a cheap alternative.

Perhaps work takes too long, because of the time taken to insert the data or, more obviously, to print it, particularly if you need to wait while it is being printed before getting on with other work, and in these cases your problem is speed. You may also find the length of documents or quantity of data is too great for your system to process at one time.

These problems mainly come from lack of memory and most of them can be solved in several different ways: buying a B+ at over £400; adding a 6502 second processor for around £200; or fitting an Aries B32 board which does much the same things for only £90. It provides a printer buffer which allows you to use the micro while printing is in progress, carries extra ROMs and addressable RAMs. The expensive solutions, though faster in operation, bring the need for more changes in your software.

You see how important it is to get advice from specialist dealers, perhaps at an exhibition. The industry is generally helpful but is slow at replying to letters! You must be careful



There are three versions of *View* available

that any software you use is compatible with your choice. No general guide can be given to this as the position changes almost monthly. At present there are three versions of *View* on the market which are almost indistinguishable in use but give problems in a machine with the wrong type of memory.

You may have ideas for other possible uses for your micro and be wondering whether you can increase its capabilities by using graphics or communications software, but the value of most of the recent software releases is now dependent on your having appropriate monitors and printers almost as much as on the amount of memory.

You are strongly advised to be careful in your choice of upgrades not only because they cost more money but also because of other consequences. If you change your accounting or database packages all your existing records may become difficult to access.

In general it is cheaper to change the



The new *InterWord* has an 80 column mode

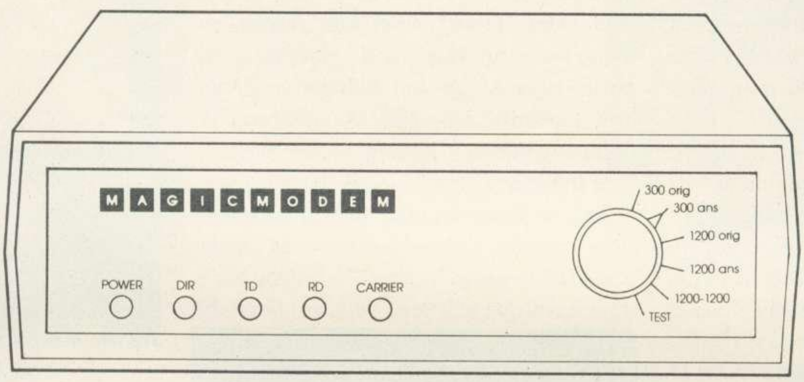
software than the hardware. You may find you need a faster printer which produces much better quality output with multi-coloured print, or a high definition colour monitor which does not give eye strain and shows the graphics to best effect, but if you use the system yourself you will probably have spotted such needs and can get advice.

It is possible that you need to put the basic range of facilities in order: you probably need to have wordprocessor, database, and spreadsheet ROMs in your micro. These will fill the available spaces and therefore justify buying a ROM board.

If you make extensive use of the wordprocessor you probably need a spelling checker, indexer (if available) and a printer driver. In the same way, the database and spreadsheet call for graphics and perhaps a statistical package to complement them. If you bought them as they were issued, some of them may well be obsolete, or even more important, may not readily share data.

This gives the clue to the emerging trend towards 'portability' by which each unit produces data in a form which the others can draw on. The most highly developed of these is the *InterLink* series from Computer Concepts which makes use of a separate ROM to convert data into a common format that can be read by *InterSheet* and *InterChart*, and will shortly be joined by *InterBase* and *InterWord* (a wordprocessor closely related to *Wordwise Plus*). These will be compatible with the B+

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and Aries Board but *not* with second processors.

To some extent the *View* family have the same potential and have the added advantage of full compatibility with 6502 second processors and other Acornsoft software. I am sorry to say that some excellent products such as the Mertec *Scribe* range and *Ultracalc 2* will begin to suffer because they don't offer the full range of facilities and will probably find it too late to develop them in the face of the competition.

Conclusion

To summarise, if you are thinking of upgrading, examine your needs and go for extra memory and a ROM board either combined in a RAM/ROM board or separately using a 6502 second processor. Then standardise on the latest compatible version of *View* or the *InterLink* package, each at around £200, and leave your accounting packages as they are, unless you find them really unsatisfactory.

If you want to have the latest and are willing to spend much more then go for one of the combined hardware packages, based on the BBC micro, such as the Torch or KBL128 PC from Pear Tree which bring a range of software (including accounting programs) built into them.

Suppliers (prices approximate)

Acornsoft, Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411. *View v2.1* and *View v3.0* (for B+, and includes a printer driver), £53; *Hi-View* (for 6502 second processors), £55; *ViewSheet*, £53; *ViewStore*, £56.35; *ViewIndex*, £11.50; *ViewSpell; ViewPlot;* and *View Printer Driver Generator*, £11.50.

Aries Computers, Cambridge Science Park, Milton Park, Cambridge CB4 4GD. Tel: (0223) 862614. Aries-B32 RAM Expansion Board, £92.

Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933. *InterSheet* with *InterLink*, £56.35; *InterChart*, £36.80; *InterWord*, £56.35 (estimated); *InterSheet*, £67.85 (estimated).

Merlin Computer Products (Mertec), 33/36 Singleton Street, Swansea SA1 3QN. Tel: (0792) 467980. *Scribe* (wordprocessor), £59.95; *Database*, £49.95; or combined as *Datascribe*, £95; *Scribechec* (spelling checker), £24.95; *Datastag* (statistics and graphics), £59.95.

Watford Electronics, Jessa House, 250 Lower High Street, Watford. Tel: (0923) 37774. Watford Double Density Filing System for BBC micro B or B+ available in various versions from £67; ROM/RAM card in various versions from £52.

OPERATING SYSTEMATICALLY

You've heard about the new Acorn micros, but what are they and what operating systems do they run under?

Simon Williams

An operating system is the machine-code program which 'cushions' the user of the micro from the harsh realities of the microprocessor and disc controller chips. In the BBC micro (including the B+) and Master 128 this operating system is divided into two parts, the Machine Operating System (MOS) and the Disc Filing System (DFS).

Often the two parts are included in one overall operating system, and the one Acorn users are most likely to have met is CP/M.

This operating system takes care of a lot of the housekeeping functions on a Z80 computer, such as the BBC micro with Z80 second processor.

The Master 512 is based around the 80186 microprocessor which is a member of the 8088 family of processors, and is used in the IBM PC. Because the two processors are closely related it opens the door to a certain amount of software compatibility, and in *theory* allows access to the IBM PC's vast range of business software. The IBM PC uses an operating system called PC DOS, which itself is a variant of MS-DOS, produced by the software company Microsoft.

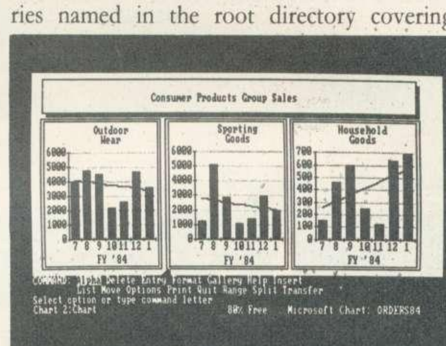
MS-DOS

Back in the early days of the personal computer, the founders of Microsoft and Digital Research came to a tacit agreement that they would concentrate their efforts on languages and operating systems respectively, so as not to keep stepping on each other's toes.

Thus CP/M became the standard operating system to run on an 8-bit micro, and Microsoft Basic became the standard dialect of Basic to use with it.

When 16-bit machines started to become available, Microsoft decided to have a go at an operating system of its own, and wrote MS-DOS. MS-DOS built on many of the facilities offered by CP/M, but adapted them to its own end, added others of its own creation, and bound the whole into a system which is rather more friendly than 8-bit CP/M (which is known as CP/M80).

Among several new features was a heirarchical directory structure. This mouthful simply means you're no longer confined to the 64 directory entries provided by CP/M but instead can define a number of different directories as sub-directories of a main 'root' directory. So, for instance, you could have directories named in the root directory covering



Microsoft Chart: runs on some MS-DOS micros

'Basic programs', 'Pascal programs', 'text files', 'spreadsheets' or 'database files'. Selecting one of these directories would then detail the program, text or data files within the subdirectory.

This directory structure is particularly useful when handling a hard disc, which typically holds 10 to 100 times the amount of data of a 5.25in floppy.

In the same way that CP/M became an industry standard and attracted a lot of software, so IBM's adoption of MS-DOS for its personal computers persuaded a lot of companies to write their commercial software under this operating system.

CP/M86

Not to be outdone, and to retain a share of the lucrative 16-bit operating system market, Digital Research rewrote CP/M80 for the 8086 processor, another of the 8088 family. The company hoped to catch loyal users of CP/M80 when they upgraded to 16 bit machines.

Although CP/M80 users couldn't of course use their old 8 bit programs under CP/M86, a similar operating system for 16 bit machines encouraged several software suppliers to con-

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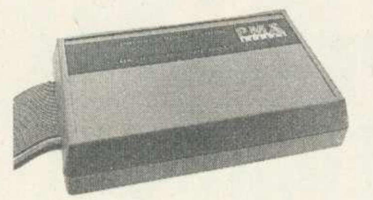
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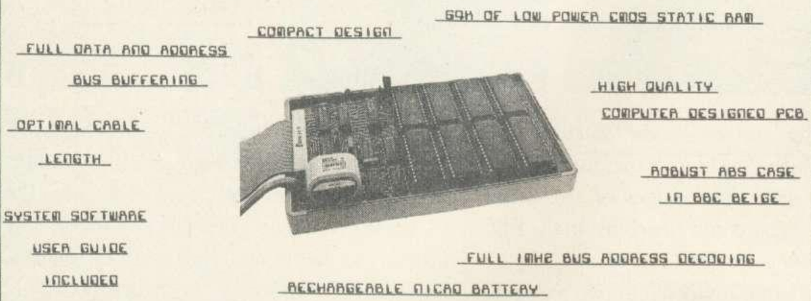


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vert their 8 bit programs for the new environment.

CP/M86 was designed to be identical in operation to its 8 bit predecessor, and anyone used to CP/M80 will not find much to surprise them in CP/M86.

The new operating system does not provide heirarchical directories, but sticks to the old limits. Some of the utilities (DDT or SID for instance) operate slightly differently, but for the most part you'd be forgiven for mistaking the system for CP/M80.

DOS Plus

Digital Research has had a fair degree of success with CP/M86, but, mainly due to IBM's adoption of MS-DOS, has not cornered the market it did with CP/M80. In the hope of rectifying this, it set to work to provide an alternative operating system for the 8088 family of processors. The result is DOS Plus, an operating system with a couple of useful extras, which is the operating system provided with the Master 512.

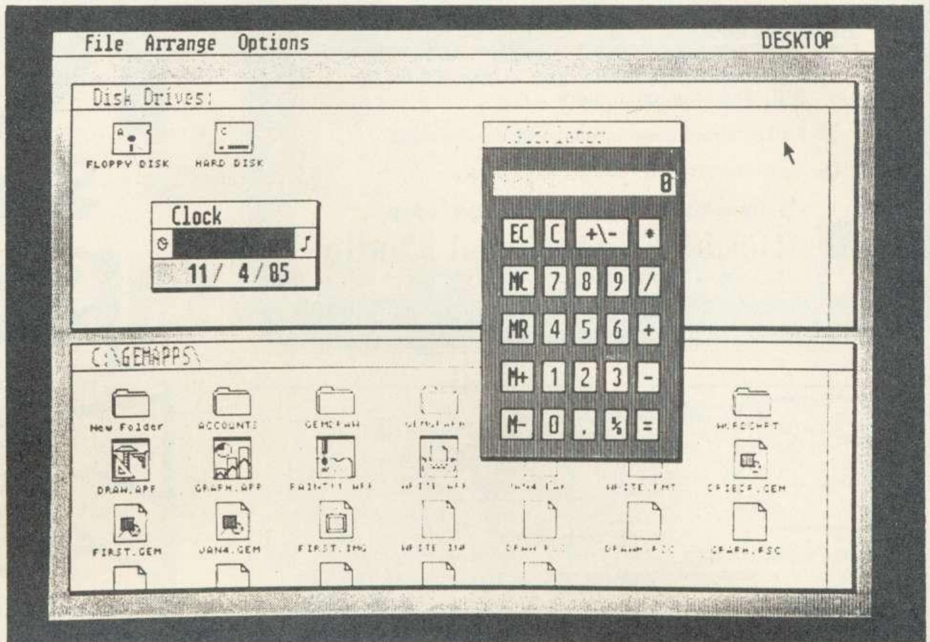
The first of these extras is DOS Plus's ability to read and write (though not to format) MS-DOS discs. This means, theoretically, that all MS-DOS format software can be loaded and run on a micro equipped with DOS Plus. In fact, hardware restraints may stop you running your IBM format software directly on the 512, although Acorn is working to ensure the most popular programs will transfer.

As well as loading MS-DOS software, however, DOS Plus can handle CP/M86 discs. This means that DOS Plus users also have access to all the software written under this operating system. DOS Plus has a lot more in common with CP/M86 than it does with MS-DOS and anyone coming to it from an MS-DOS machine will need to relearn a few commands.

DOS Plus can read files from an MS-DOS heirarchical directory, and can set up similar directories for itself, but only on a DOS Plus formatted disc.

This is a departure from the simple directories of CP/M, and makes DOS Plus more suitable for use with a hard disc.

The other interesting feature of DOS Plus, one which singles it put from MS-DOS and CP/M86, is its ability to do several things at once (called multi-tasking). With DOS Plus you can define up to three 'background' tasks to be carried out while you're doing something else with the machine in the 'foreground'. For example, if you were using a wordprocessor, you could get DOS Plus to print out one file while you were working on another. Background jobs are easily set up using the BACKG command, and you can specify what



GEM uses windows, icons and a mouse to move a pointer around the screen

proportion of its time the processor devotes to each task.

DOS Plus is a very interesting compromise between two popular operating systems, which also provides multi-tasking to endear itself to users in its own right.

GEM

Anybody who has seen advertisements for the AMX mouse and its application programs will have noticed the radically different design of the screen, which uses windows, icons and a mouse to move a pointer around the screen; the so-called WIMP environment.

Digital Research's Graphics Environment Manager (GEM) does much the same as AMX, or Apple's Macintosh, to produce an easy-to-use operating system. Its main advantage is that, like CP/M, it can be transported from computer to computer, to run on a number of different processors. The main versions available so far are for the IBM PC and Atari ST micros, and the version of GEM on the Master 512 is a derivative of the IBM PC GEM. Here are some of the things it can do for you.

GEM itself is a series of graphic routines which application programmers can 'latch on to' within their own programs. As far as the user of GEM is concerned, though, the first sight they will have of the system is via GEM *Desktop*, an application program supplied by Digital Research.

As the name suggests, it simulates the kind of equipment you might find on an office desk. There's a calculator and digital clock and you can call up details of any of your disc files, which are displayed as icons of folders or files, with their filenames beneath. Each of these facilities is called by moving an arrow pointer to an option on a single strip across the top of the screen, and pressing one of the mouse buttons. A 'pull-down' menu then appears beneath the option and you can select any item on the menu by pointing to it and clicking the mouse button again.

The calculator appears in the centre of the screen, looking much like a simple four-function machine with memory. You can operate the keys by pointing to them with the mouse or using the keyboard, whichever you find more convenient.

The clock shows the date and time, and is maintained by the Master's battery-backed system clock. You can also set an alarm to remind you of appointments, or to stop work at midnight!

Two GEM application programs are also supplied with the Master 512. These are GEM *Draw*, which is similar to the AMX *Art* program, and GEM *Write*, which is a version of the popular American wordprocessor, *Volkswriter*. There are other application programs available such as *Jazz*, an integrated suite of wordprocessor, spreadsheet and business graphics programs from Lotus, the software house which produced *1-2-3*. Several other programs are under development.

It's quite possible to call up other, more traditional, applications from within GEM, but of course the menus and icons won't extend into these programs.

Overall, GEM makes certain jobs on a business micro a lot easier to do, particularly browsing around databases and spreadsheets, and certainly serves to make any micro a lot more approachable.

EDUCATION

NEWS

What are your top five software packages?

The rather peculiar 'top ten software for 1986' published by Eric Deeson in the *Times Education Supplement* at the beginning of the year did not seem to reflect the excitement expressed in response to the 'new wave' of software.

To satisfy some personal curiosity, triggered by the varied responses received to the question 'What do you think is the best bit of software ever for the BBC?', I would be interested in hearing of your own top five educational software items for the BBC and/or Electron. This also serves a useful purpose in communicating your discoveries to others.

Your definition of 'educational' may differ from the next person's but certainly include such things as wordprocessors, spreadsheets and anything you have used with success in the classroom. An analysis of your responses will be published, naming the top five items and, if space permits, a breakdown of other packages.

Wordwise Plus	**Computer Concepts**
Paint Spa	**Software Production Assoc.**
RML Logo	**RML**
Logotron Sprite Board	**Logotron**
DDD suite	**Gemini**
CommunITel	**CommunITel**
Desperate Journey	**Jordanhill College**
Dragon World	**4 Mation**
Magnus Connection	**MEP**

The TES 'top nine software' chart

Please send your top five, clearly numbered, on a postcard to: Education Top Five, *Acorn User,* 142-143 Drury Lane, London WC2B 5TF. Include your name, address and telephone number – so we can contact you if your choice is particularly interesting. Answers by the end of April.

Mastering potential

The Master's here and it looks good. The possibilities with this machine are immense – so immense it's unlikely that the education establishment will plumb its depths for some time.

The situation will be similar to when the Beeb first emerged on the scene and programmers, still in Apple and PET mode, produced simple, rather drab programs enlivened by a bit of music. It was difficult to predict the high-speed, high quality graphics and the exciting design tricks that would lead us, in the games field, to such wonders as *Elite* and in graphic design to 3D graphics development systems such as that produced by Glentop, or the AMX Mouse or the Music System from System Software and so on.



The Master: immense possibilities

We should give three cheers to Acorn for ensuring upward compatibility. The underlying trend of sensible CAL software will be able to continue in response to the needs of schools.

There will be no great problems for schools without the new machine. Materials will almost certainly continue to be produced for both. Those that are exclusively compatible with the Master will be so sophisticated that they will probably (initially at least) be outside the requirements of schools that have not bought the machine.

Schools are going to need to assess whether their computing needs are such that developments for the Master will find a place in their curricula. If so, then they need the machine.

Beeb goes to press

1986 is definitely going to be the year of the news-sheet production unit – packages such as *Pagemaker* from AMS (£49.95) and *Fleet Street Editor* from Mirrorsoft (£39.95) are offering teachers the possibility of producing their own A4 news-sheets printed with graphics, digitised photographs and many text fonts.

The main difference between them is the medium in which they are presented. *Pagemaker* comes on two ROMs – 16k and 8k – which slot into the micro. *Pagemaker* did not like my expansion board at all and the company does warn in its documentation that it only guarantees operation on 'unadulterated' Beebs. Having said that, the package is capable of the type of wonders which we have come to expect from AMS – spray, paint, rotation, flip, zoom and enlargement, and the facility to produce a full A4 sheet by 'windowing' sections.

Fleet Street Editor, on the other hand, is not tied to a machine by ROMs – it operates from two discs and is also capable of production of A4 pages by creating a series of panels which make up the complete page. The package includes a graphics library of 600 pictures and the facility to create more. Although the approach is different the end result appears to be just as good although there is not the same flexibility in this disc-based package as there is with the AMS version.





Commentary by Nick Evans

In the field of TAPE to DISC transfer we don't need to blow our own trumpet!

These comments from some of our customers will be enough to convince BBC 'B' disc users that the Replay System is worth more than a second look.

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"an excellent product at a reasonable price."
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"I am very, very impressed by the power of the ROM, and the ease of use it gives."

"I find the REPLAY ROM to be a must for anybody who takes computer games seriously."
D.R., Hereford.

"the REPLAY ROM is a remarkable facility."
A.J.P., London.

"I was pleased with the T.D.ROM but REPLAY is terrific."
V.M., Kent.

"All my tapes have been effortlessly transferred to disc and work well; the pause and update facilities are excellent."
T.G.B., Cheshire.

"Congratulations on a superb product. For my book it's the best utility I've seen for the 'Beeb'."
C.E., Liverpool.

"we have transferred over 60 cassettes with no problem at all even though we were completely new to disc-drive methods."
W.B., Bolton.

"A marvellous addition to my system."
P.B., Ashford, Kent.

– and to anyone wondering about our service, may we add the following:
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REPLAY FACT FILE

REPLAY is a Hardware/ROM-based system, the unit can be easily installed without soldering, though if you have a ROM expansion board make sure that the REPLAY ROM can be fitted into one of the computer's own sideways ROM sockets.

With REPLAY installed games can be stopped and saved directly to disc at any time.

REPLAY can load back a stopped screen from disc ready for printing out with a suitable 'printer dump' routine.

Liven up your games with REPLAY: Different background colours: Infinite lives: Hyperspeed: Extra gears: Edit the improvements working from the data sheet supplied.

REPLAY can 'pause' games which do not have this facility built-in, and is also able to offer most disc to disc transfer.

The REPLAY System is intended to provide a facility for individual users, resulting discs are not recognised by a different computer.

Further details and copies of reviews can be supplied on request.

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Is there life after the MEP?

On March 31 the MEP ceases to exist and with it the regional centres whose names have become synonymous with computer information. Local education authorities are now thrown back on their own resources.

Some authorities are ready for the change, however, and have set up their own independent microelectronics centres which are already flourishing. Those which have either no centre or have only a poorly supported one are going to find themselves in difficulties as the year progresses.

Critics

MEP has had many faults which have been seized upon by its critics, but what has it achieved? In five years it has taken this country from computer ignorance to the forefront of educational computing, which will stand this nation in good stead for many years to come; it has also provided expertise which is now beginning to filter through the whole education system.

In its place comes the Microelectronics Support Unit (MSU or MeSU). This organisation, at the time of writing, has not even begun to exist since its hierarchy has not even been decided and it is unlikely to be settled until September.

Main tasks

The idea at present is that the organisation should be centrally based with in-service education, information and software support materials development as its main tasks.

Until it gets its act together, though, it will be interesting to watch the ways in which LEAs deal with computer support. I should be very interested to hear of any original schemes which are taking place around the country.

What the Master means

Now that the rumpus about the Master has died down a little, educationalists nationwide are trying to consider what the production of this box of tricks means to them. Those who invested in the B+ are probably feeling a little sore, although the atmosphere of rumour and counter-rumour that existed in the months before Christmas indicated that something was afoot. Now it's here, where will the Master lead us? What differences will this increase in power and flexibility make to the style of our top ten software items in 1988, for example?

Without knowing the developments possible, this question becomes a nonsense. The certainties about the machine are that it is a communicator – inter-computer links will be easier and more efficient; it is a workhorse – the on-board software ensures that major tools are present and ready; it is flexible – the ability to emulate PCs means that in the whole range of computer applications in education this machine is even more poly-curricular than the Beeb.

Schools, software houses and all those involved in educational computing will need to readjust their perspectives. In the same way that changes came about when the Beeb first emerged, so now we will need to broaden our horizons and take a view that is less limited and constricted than before. For software houses there will be a great feeling of release. No longer will there be the necessity to cram the proverbial quart into the pint pot – all praise to many software houses for what they *did* manage to cram into it.

The new machine comes at a crucial time. Here we have the end of MEP, the beginning of MSU, the possibility of a European Education Standard for Computers as postulated by Acorn and growth in manufacturing industry.

All of these things imply that we need to be sure of what we are doing in the future. The future is governed by the decisions made now. If education wastes the opportunities available then the nation as a whole suffers, not just education. Consequently, a coherent strategy for implementation of computer use across the curriculum needs to be made. Up till now we have done this on an adhoc basis which has worked surprisingly well, mainly because it has all been experimental. Such a task can only be undertaken and co-ordinated on a national footing. The MSU is the logical agency for the task. It is to be hoped that it is aware of the need our children have and that the fulfilment of it is to be part of its brief.

Bulk-buy ROMs for schools deal

Schools can now bulk-buy Acornsoft ROMs at discounted prices via three options: a) bulk purchase of 10 ROMs at a time; b) Site Licence – an Econet version of software on disc for Level 2 Econet with 128k B+ stations; or c) LEA Area Licence – as for b) but for distribution to all secondary schools.

In all these cases documentation is ordered separately. To give an example, a school ordering *View 3.0*, which is normally £89 per copy, would order 10 ROMs at £390 exc VAT, one manual at £10 and a components pack (key strips, etc) at £7.50 making a grand total of £407.50 or £40.75 per machine.

A site licence for the same package would cost £390 ex VAT and an area licence would be £273 times the number of secondary schools. Details and a price list from J Preston, Marketing Manager, Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD.

EDUCATION TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Best 4 Language	ASK	£19.95	£19.95	—	Yes	Yes	—	—
2	French Mistress B	Kosmos	£8.95	£9.95	—	Yes	Yes	—	Yes
3	Best 4 Maths	ASK	£19.95	£19.95	—	Yes	Yes	—	—
4	Castle & Clowns	MacMillan	£6.95	—	—	Yes	—	—	—
5	Early Learning	BBC Soft	£10	—	—	—	—	—	—

Compiled by Gallup/MicroScope. Contact publisher: BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577. Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds. Tel: (05255) 3942. ASK, London House, 68 Upper Richmond Road, London SW15. Tel: 01-874 6046. MacMillan, 4 Little Essex Street, London WC2R 3LF.

IN SEARCH OF ADVENTURE

Simulations may be wide-ranging and complex or comparatively simple and restricted – we look at how to get the most from them

Chris Drage and Nick Evans

A simulation is a program which attempts to convey the principles of some law or to emulate the atmosphere and conditions of a given human situation by providing a catalyst in the form of graphics, text or sound from the computer. They may be wide-ranging and complex or comparatively simple and restricted, depending upon their subject matter and the intended audience. A successful simulation causes the user to say 'I see what happens' or 'I know how we can deal with this situation' in response to the need for understanding or reaction that the program demands.

Simulations have been with us for a long time, not just in the computer world but also in the home and in school. *Monopoly*, although rather dated in its finance structure, still accurately represents the cut and thrust of high power business. Working models of geological phenomena or of natural forces demonstrate the workings of something which is impossible to capture other than by representation.

In a computer simulation of a human situation a child may be made to take decisions of life and death, fight or flight which cannot be experienced normally without extreme danger. Decisions involved in historical situations may be understood better by placing the child in the role of the decision maker without giving him the consequences of his decisions in anything other than imaginary terms. The nuclear reactor cannot be investigated adequately without extreme danger. Just what are the consequences of uncovering the core of the reactor? Find out on a simulator!

Children are not allowed to fly aeroplanes and yet, with a suitable simulator, a jumbo or a Spitfire may be piloted, landed, crashed and resurrected with impunity. Knowledge of the principles of flight, the mechanics of instrumentation and even the thrill of successfully landing a plane may be had from the basic Beeb. This month a small selection of simulations are looked at: we hope to show why they are useful and how to approach them in the classroom to obtain maximum benefit.



The children experiencing a 'day' on Ginn and Company's Adventure Island

'We set off nice and early in the morning. We didn't have to bother about getting any food because we had lots of fish we caught the day before. We headed in the direction of the track. We got on it. We came to a stream. The sun was beating down on us, so we all stopped and had a drink and used one of our water purification tablets.'

This extract from 10-year-old Sheena's 'diary' proves how real a computer simulation can be for children, providing it is introduced and developed with care. For two weeks of the summer term 1985 a class sweated and clawed their way through the rain forest and perils lurking on *Adventure Island*, simulating survival on a deserted island.

This excellent program developed skills of decision-making, self-reliance and attitudes of co-operation and empathy as well as the full range of subject-orientated skills, knowledge and concepts. We had the school's Beeb continuously and the normal timetable went out of the window for the fortnight the class spent on *Adventure Island*. It was two weeks all the children agreed were among the most enjoyable and challenging they had ever encountered at school.

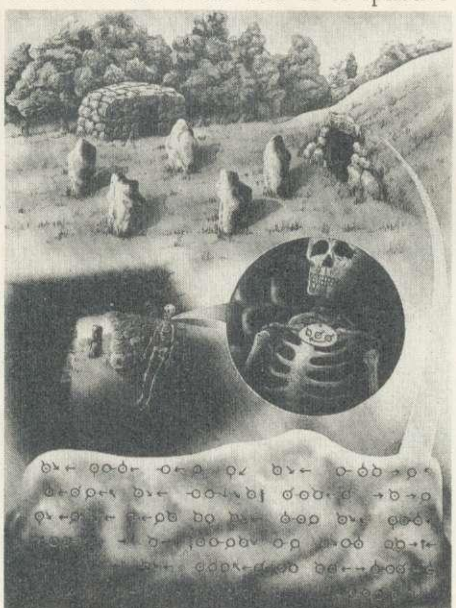
The scenario is simple. The children, in groups of four or five, are put ashore on one of the island's beaches. They must explore the island, survive the many hazards and find a means of escape. The software keeps a separate file on each group so, as far as they are concerned, each is unique. Thus, groups never meet each other.

The package provides some supporting materials: an attractive, full colour, A3 map on which a grid is marked; a survival guide; illustrations of various places of importance on the island; and a teacher's manual. This was not quite adequate for the number of groups I had participating so I made 'survival kits' for each group based on the materials provided. Each

group had a map, their own set of illustrations and a survival booklet.

To what depth the simulation is used is determined by the teacher. I was determined that this was to be an all-encompassing topic and gathered many supporting resources. These ranged from taped BBC broadcasts of the *Man Programme: Survival*, library books and illustrations of tropical flora and fauna.

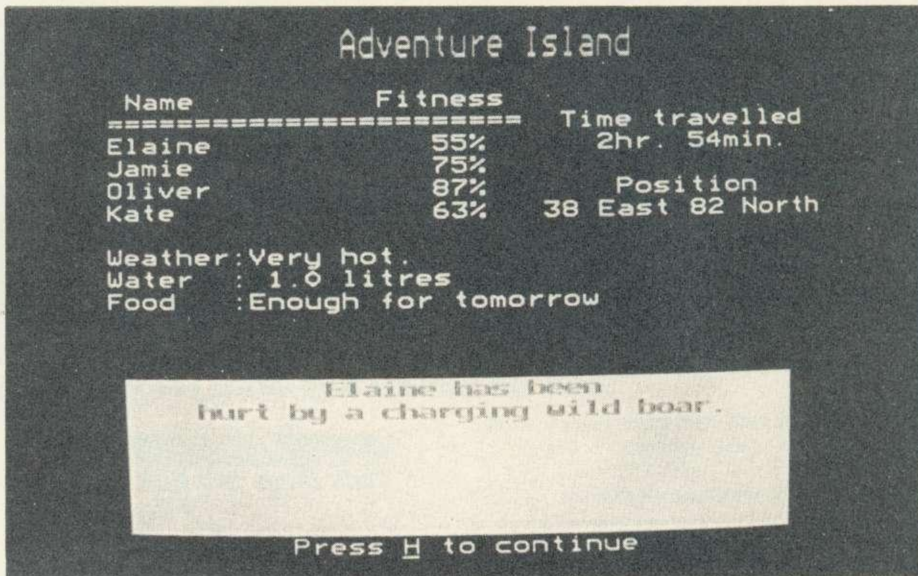
With any computer-based simulation there will be a number of pre-requisite skills and concepts that the children must have if they are to gain the most benefit from the experience. In *Adventure Island* co-ordinates are used to determine movement and making the correct decisions at certain times, based on the available evidence, determines survival and rescue chances. It was in the area of co-operative



Site of the Island's ancient temple

decision-making that I decided the children needed most practice. Two weeks before being marooned the children worked through selected broadcasts from the BBC's *Man* programme. Stories of the survival of individuals (Alexander Selkirk) and groups (The Kibbutz) heightened children's awareness of the need for group co-operation, joint decision-making and role play. An interesting outcome of this preliminary work was the strong feeling that both sexes should shoulder all the work equally. The question of leadership also arose. Most children happily adopted a democratic approach; others wanted an individual to be their arbitrator. Some groups formulated rules to govern their behaviour.

Before being cast ashore the children were allowed to choose five survival items from a list – the preliminary work prepared the children well. They chose their items very sensibly indeed, most opting for such things as a first aid box, fishing lines and an axe. I



Adventure Island: develops skills of decision-making and self-reliance

decided the composition of each group as I wanted to make sure each group had a balance of the sexes and reading ability.

Each group spent a simulated day on the island (20 minutes at the micro), during which time they explored, located items of food and prepared to meet some of the island's less savoury inhabitants and fall into traps for the unwary: '. . . . as we explored the mine Shila was bitten by a scorpion and her fitness went down by 50 per cent. We gave her penicillin from the first aid box. We continued to the hut but then we fell into the swamp. It was too late when we realised it was there. Shila completely fell in. We tried to pull her out. Shila sank . . . ' – Harpreet.

When the group's time at the computer was up, they 'retired for the night', and returned to their desks to write their individual diaries. This involved a good deal of reading. Any creatures, food, or special items discovered had to be researched in books, information gathered and illustrated. The amount and quality of the writing really staggered me – the children were so motivated they thoroughly enjoyed the follow-up work. In certain situations mathematics had to be used to solve the whereabouts of treasure; in other situations logic and common sense prevailed.

The most enjoyable problem-solving situation took place on the beaches. Here children were not only given the option to fish (if they initially chose the fishing line), but to build a raft. To each group with an axe I gave some balsa wood and a length of cotton to represent timber and lianes. With these materials they had to build a raft that would successfully support 1/100 scale plasticine models of the group members in a bowl of water. If successful, the group could then sail to another part of the island or to a neighbouring island and explore that. A considerable amount of practical mathematics came out of this activity.

'We took the wood back to the beach. We made the raft out of two triangles of wood tied with vines. Everybody should know that triangles are very strong shapes. The day was warm so the raft would not be knocked about too much on the lovely light blue sea . . .' – Daniel.

Outcomes of the adventure included: two groups rescued, two groups dead and three groups inconclusive (they are still searching the island!). All agreed it was a thoroughly worthwhile exercise.

I hope by this illustration to show that a good simulation can form the basis for a substantial piece of classroom work encompassing all areas of the curriculum. It requires the teacher to develop the learning resources and be prepared to adopt a more advisory role. Good simulations for the primary area are readily available: try *Suburban Fox*, *Expedition To Saqqara* or *Mary Rose* from Ginn or *The Vikings* from Fernleaf for a start. You will not be disappointed.

In secondary schools the approach is, unfortunately, very different. The thematic idea covering a multitude of disciplines is something treated with scorn by subject teachers despite the efforts of HMI and advisory staff to produce cross-curricular integration. The resistance is historical and has more to do with the demands of the examination system than anything else. Consequently the use of simulation tends to be subject specific without the broad base which the primary simulations exploit so well.

There are many examples to choose from and exclusion from these pages implies no criticism, merely personal experience. Cambridge Micro Software has been producing

simulations for some time and one of their oldies is *Moving Molecules* – a package which demonstrates the effect upon molecules of heating, cooling and change of pressure. Every time I've used this package with teachers they've come up with ideas for alterations to the pack, forgetting that its intention is to demonstrate a principle, not to be all things to all scientists. It is one of those occasional programs that may be exploited simply because it demonstrates (more clearly than any other method) a principle which is impossible to observe normally. It is electronic blackboard material and actually does have problems in this respect since on a small monitor the 'molecules' are rather difficult to see from a distance. Naturally, it is up to the teacher to arrange appropriate use of the program so pupils obtain the best benefit from it.

It is important to remember that simulations are not teaching machines – they don't do the work for you, they help you do the work better or more easily. For example, BBC Soft has been producing a large number of secondary science simulations recently, one of which is called *Electromagnetic Spectrum*. This fundamentally academic topic, with its relationship to physics theory and formulae, is given a new lease of life by being put in an adventure game situation where the principles of the electromagnetic spectrum are the keys to success. The adventure takes the user into the realms of navigating to the planets, building a two-way radio and into the laboratory to complete a series of tests on rock from the solar system. As the documentation says 'you'll find you have to make use of the formula $v = f\lambda$ on occasions. Make sure you are well acquainted both with the formula and its implications!'

The groundwork has to be done by the teacher and the sequence of events is something like this: introduction to the general topic; development of specific elements which are necessary for understanding the simulation; the simulation itself; and further development work.

Science is not the only area for simulations, however. The humanities provide plenty of examples, especially within the field of history, but it is on personal and social development that we shall concentrate for a moment. A further pack from Cambridge Micro Software is their excellent *Making Ends Meet* package which presents the pupils with a continuing financial setting based on real-life spending situations. They choose their accommodation, transport, social life, holidays and so on and are able to save money for future needs. The financial disasters that beset us all, such as the car needing repair or friends going on holiday when you are broke, crop up regularly. Pupils enjoy the game, see the point and learn something about simple financial management in the meantime.

On a larger scale, programs for economics such as *GB Ltd* from Simon Hessell and *Yes, Chancellor* from Chalksoft present an opportunity to run the country's finances. It's much easier to explain the balance of payments, aid to industry, the differences between public and private sector wage claims and the concept of inflation if the pupils to whom these ideas are being presented have to take them into account in a 'real' situation. The side-effect of enjoyment (when your party is not elected after five years because inflation is at 500 per cent and there is rioting in the streets) provides motivation to consider all the variables in a sensible and rational fashion. If this model of economy is then related, by the teacher, to the situation in the country at the time then understanding is far more likely to take place.

In summary, simulations stand or fall not on their own merits but on the support that a teacher is able to build around them. They can provide a motivating force which is unparalleled in any other educational tool. It is possible by discreet use of a simulation not only to educate but also to motivate a pupil. Context is all important and it is the teacher's responsibility to prepare the ground adquately. Some packages help the teacher to do this with outlines, development material and background reading while others merely provide the bare bones.

All the packages, however, allow the teacher to experience a change in relationship with his or her class from being the teacher to being the guide in a learning experience. Nearly all who have trodden that rather frightening path will admit that although it is demanding it is also highly rewarding.



Moves are planned and strategies discussed



Writing the diary and researching the tropical fish caught on the beach

Making Ends Meet £15, BBC cassette and disc
Cambridge Micro Software, Edinburgh Building, Shaftesbury Road, Cambridge. Tel: (0223) 312393.

Moving Molecules, £13.95, BBC cassette and disc
Cambridge Micro Software (as above).

Yes, Chancellor £17.50, BBC disc
Chalksoft, PO Box 49, Spalding PE11 1NZ. Tel: (0775) 69518.

GB Ltd, £5.13, BBC cassette and disc
Simon Hessell Software, 15 Lytham Court, Cardwell Crescent, Sunninghill, Berks.

Electromagnetic Spectrum £17.20, BBC disc
BBC Soft, 35 Marylebone High Street, London W1M 4AA.
Tel: 01-580 5577.

Adventure Island £32.50, BBC disc
Ginn and Company, Parsons Fee, Aylesbury, Bucks HP20 2QZ.

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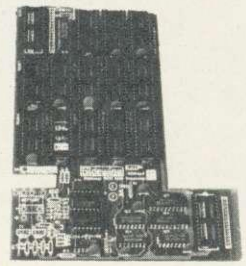
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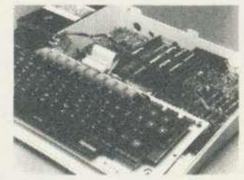
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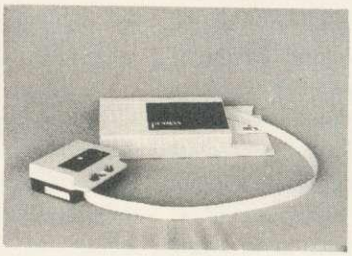
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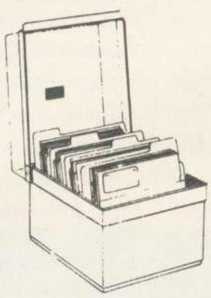
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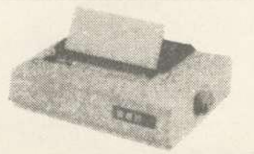
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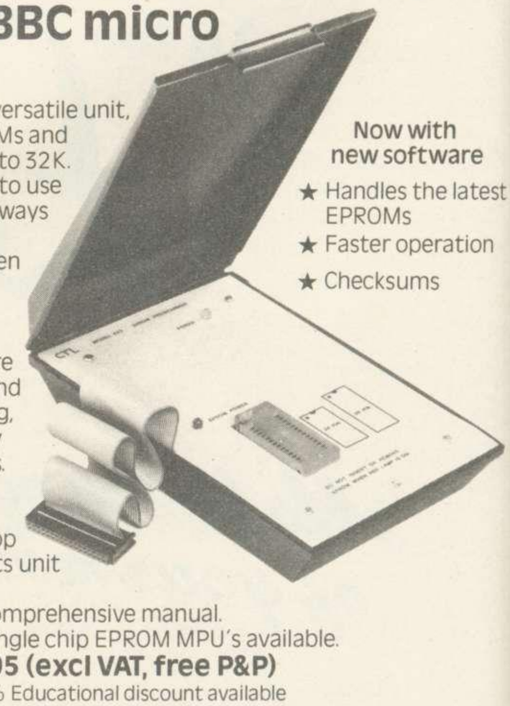
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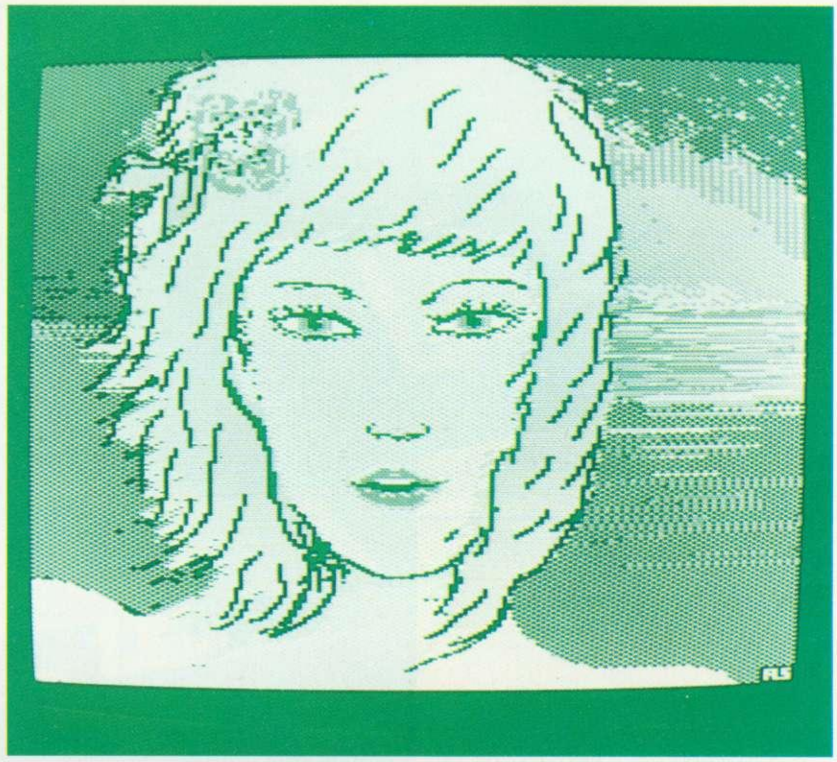
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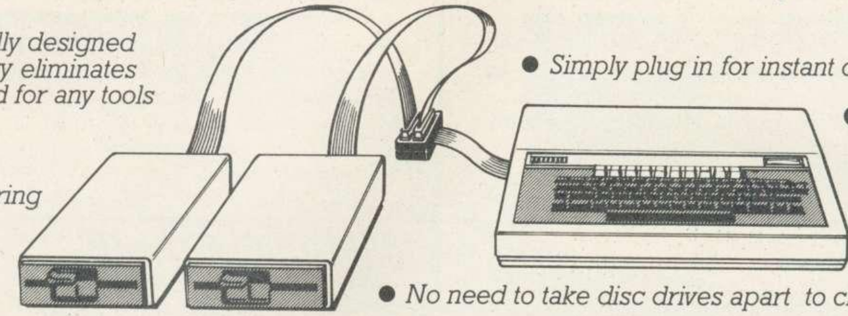
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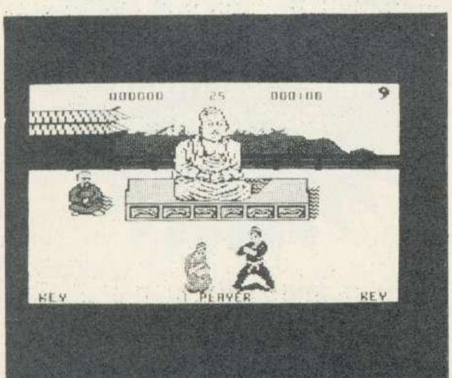
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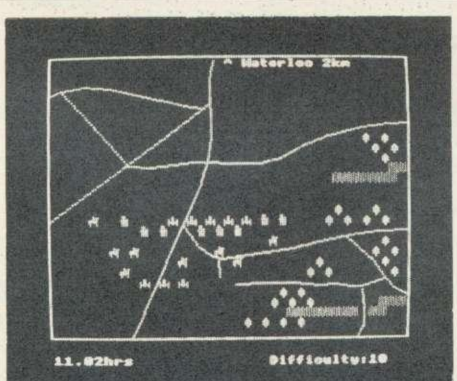
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TOP 20 BBC MICRO GAMES

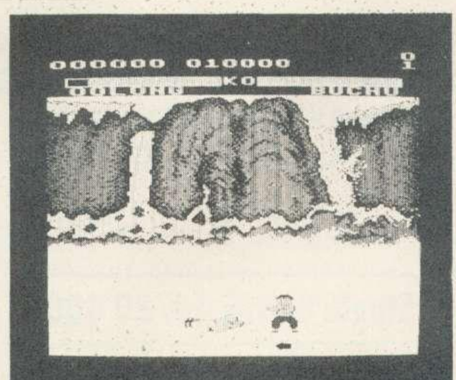
	Title	Publisher	Cassette	Disc	Reviewed
1	(11) Yie Ar Kung Fu	Imagine	£9.95	£12.95	March '86
2	(2) Way of the Exploding Fist	Melbourne House	£9.95	£14.95	April '86
3	(1) Strike Force Harrier	Mirrorsoft	£9.99	£12.99	January '86
4	(3) Repton 2	Superior	£9.95	£11.95	December '85
5	(6) Nightshade	Ultimate	£9.95	–	–
6	(18) Dr Who and the Mines of Terror	Micro Power	£18.95	£19.95	March '86
7	(7) Computer Hits (10)	Beau Jolly	£9.95	–	–
8	(4) Match Day	Ocean	£9.95	–	January '86
9	(–) Citadel	Superior	£9.95	£11.95	March '86
10	(–) Gyroscope	Melbourne House	£8.95	–	–
11	(5) Revs	Acornsoft	£14.95	£17.65	July '85
12	(–) Bullseye	Macsen	£8.95	–	–
13	(17) Waterloo	Lothlorien	£9.95	£12.95	April '86
14	(8) Elite	Acornsoft	£14.95	£17.95	October '84
15	(–) Speech	Superior	£9.95	£11.95	February '86
16	(9) Combat Lynx	Durell	£8.95	–	September '85
17	(14) Blockbusters	Macsen	£7.95	–	–
18	(12) Monopoly	Leisure Genius	£12.95	£14.95	March '86
19	(–) Phantom Combat	Doctorsoft	£9.95	£11.95	February '86
20	(16) Bored of the Rings	Silversoft	£6.95	–	March '86



Exploding Fist: reviewed on page 163



Waterloo: battling up the charts



Kung Fu: leaping to no. 1

TOP 10 ELECTRON GAMES

	Title	Publisher	Cassette	Disc	Reviewed
1	(1) Computer Hits (10)	Beau Jolly	£9.95	–	–
2	(–) Yie Ar Kung Fu	Imagine	£8.95	–	March '86
3	(2) Beach Head	Access/US Gold	£9.95	–	December '85
4	(3) Repton 2	Superior	£9.95	£11.95	December '85
5	(5) Star Drifter	Firebird	£3.95	–	–
6	(8) Football Manager	Addictive	£8.95	–	March '85
7	(–) Gremlins	Adventure Int	£7.95	–	–
8	(6) Blockbusters	Macsen	£7.95	–	–
9	(–) Steve Davis Snooker	CDS	£8.95	–	–
10	(–) Gyroscope	Melbourne House	£8.95	–	–

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REVIEWS

GAMES

ENTER, THE EXPLODING FIST



'The Way of the Exploding Fist', Melbourne House, BBC B and B+, £9.95, £14.95 (disc)

You just know from the title of this game that it's going to be a Bruce Lee epic, with lots of leaping about the screen, somersaulting and delivering the most unlikely kicks and punches in mid-air.

And so it is. This kind of martial arts simulation needs decent animation, a wide range of moves available to you, a sensible means of executing them all and – when you're pitting your wits against the computer – an opponent who interacts with what you're doing. This game has everything.

Well, just about. The animation of your Bruce Lee figure and his opponent is slick and convincing. And you have an astonishing diversity of jumps, kicks and punches at your disposal. It's just doing them that's difficult. Using a joystick gives you a choice of eight moves, jumps and punches without the fire button pressed (up, down, left, right and the diagonals); and a further eight kicks with the button pressed. It's not easy to remember all 16, but it's fun trying. Doing all that on the keyboard is well-nigh impossible – hitting a total of 10 keys in different combinations causes finger fatigue and, ultimately, a case of brain damage.

In one-player mode, the object is to fight a series of bouts and progress from novice to 10th Dan. In two-player mode (can you imagine two players hitting 20 keys between them, at high speed? 'The Way of the Exploding Keyboard'!), you just fight it out, trying to score hits on each other.

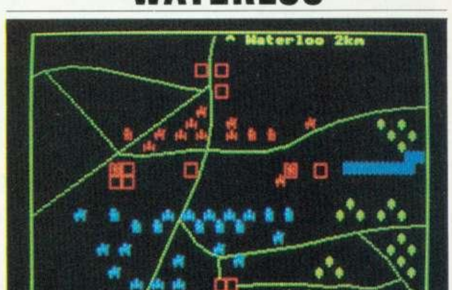
A good way to practise is to play in two-player mode without a second player. Your opponent just stands there like a dummy while you whirl around, somersault over him and kick him in the ear.

I assume all the moves are based on real karate techniques – things like the Roundhouse Kick and the Forward Sweep sound pretty authentic to me – and perhaps that's why the fight keeps stopping automatically every five seconds or so for the characters to bow to each other. That's a bit disconcerting at first, but it teaches you to make your move quickly before you're forced to back off.

Even more disconcerting is the plunky Japanese music which plays throughout. I can't find any way of muting it, short of disconnecting the speaker, and it gets so annoying after a while that I feel like giving the micro a short jab kick. If only I could remember how to do a short jab kick . . .

Jeffery Pike

MEET YOUR OWN WATERLOO



'Waterloo', Lothlorien, BBC B and Electron, £9.95, BBC B £12.95 (disc)

The latest wargame from the people who brought us the *Confrontation* series and other belligerent classics like *Paras* and *Johnny Reb*. This one enables you to replay (refight?) the Battle of Waterloo, and begins with Wellington's and Napoleon's armies drawn up exactly as they were at 11am on June 18 1815. From then on, it's entirely up to you to decide the course of history.

If you're lazy or a pacifist, you can watch your micro play the whole battle by itself – which should give you some ideas about tactics. Or you can fight against the computer (but only as Napoleon, not as Wellington – I wonder why?). Or two players can battle it out between them. You bring your artillery, cavalry and infantry into action by darting a cursor across the battlefield and, if you're anything like this amateur Napoleon, you then watch them being methodically wiped out by the superior tactics of the Iron Duke. It's a race against time anyway: if you can't rout Wellington pretty quickly, old Blucher soon turns up with his Prussian army and completely overwhelms you – just like in 1815.

It's a most enjoyable experience if you revel in this sort of haphazard chess game. There's an almost infinite choice of moves and tactics to keep the game exciting, so no two battles should be the same.

The graphics are somewhat primitive compared to what the BBC micro and Electron are capable of, but they are secondary to the logic programming which keeps the pieces on the move, especially when the computer's army is playing yours.

A few little niggles make it a less than perfect piece of software. First, it's difficult to position the cursor accurately using an analogue joystick (a switched joystick makes it much easier).

Second, if you decide to use the keyboard option rather than a joystick, there's no choice of keys and the ones chosen for you are a bit eccentric. A more orthodox set for up, down, left and right would help the inveterate games player enormously.

Third, at the end of a battle, there's no way to start the game again without reloading the whole program.

And finally, cassette users – who need patience at the best of times – have to sit through an interminable loading process. If you choose to skip the lengthy instruction screens (it's all in the book anyway), you still have to wait for them to run through the tape. Then, whether you've chosen keyboard, joystick or computer only, you have to wait while the two unnecessary programs run through before you get to the vital data.

Take a tip from Napoleon and *CAT your cassette with the tape counter, so you know where to fast-forward.

Jeffery Pike

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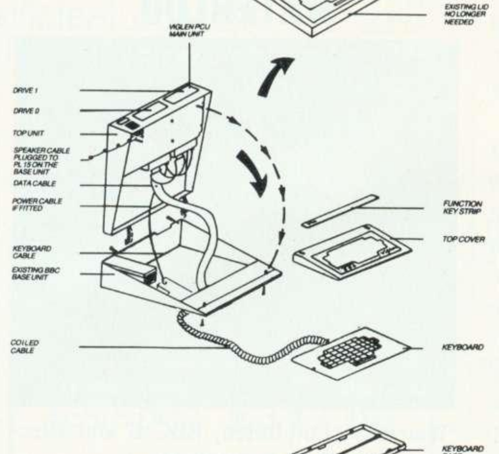
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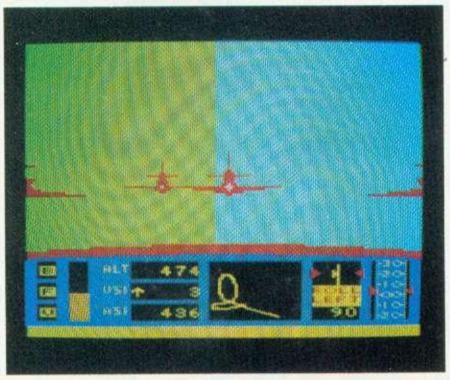
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REVIEWS

GAMES/BOOKS

DEATH-DEFYING DISPLAY



'Red Arrows', Database Software, BBC B and B+, £8.95, £12.95 (3in disc), £11.95 (5.25in disc)

Here's a flight simulation program with a difference, available at last (in an improved version) for the Beeb. It doesn't boast as many cockpit controls, knobs and dials as some simulators, the view through the windscreen is not as detailed or authentic as in others, and there's no opportunity to blast enemy aircraft out of the sky. But what makes *Red Arrows* special is the skill you need to develop to fly in tight formation with other aircraft – for the object of the game is to fly alongside the RAF's crack aerobatic team in manoeuvres they actually perform in their death-defying displays. Indeed, the Red Arrows team are credited with helping the authors in designing the program.

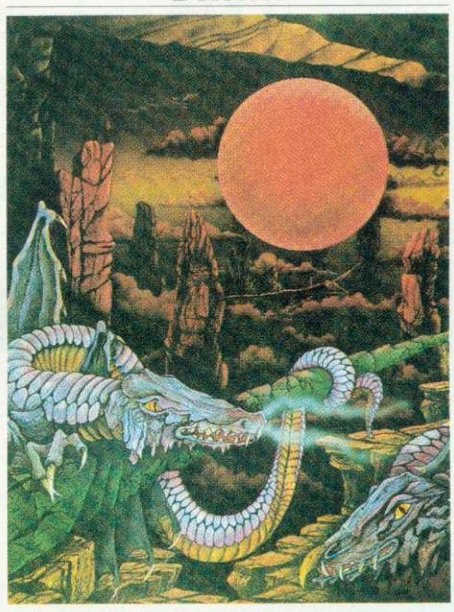
Whether you choose joysticks or keyboard, it's not easy even to fly your Hawk straight and level (it's a very sensitive aircraft), and the first time you try flying in formation, you'll probably set back the Red Arrows' reputation 10 years by screwing up the whole routine. For this reason, there is a series of training exercises for you to practise on alone. Then, when you feel fit to join the team, you can 'cheat' at first by requesting screen instructions for every manoeuvre, or by letting the micro look after the throttle and airbrakes while you handle the steering, or vice versa. You can even use the Return key to bring you back into line if you get hopelessly lost.

The screen display offers you the basics of air speed indicator, altimeter, thrust indicator, artificial horizon and so on, but in fact you learn not to fly on your instruments too much. The real skill lies in keeping in contact with the rest of the Red Arrows, who are sometimes frighteningly close (as in real life, one presumes), sometimes distressingly far away. The animation is not seamlessly smooth, but despite what's going on, the screen is updated four times a second – quite fast enough for the novice pilot.

Altogether, it's a very clever, very demanding flight simulator. My only fear is that, when I can perform the Big Nine loop, the Pyramid Roll and the Concorde Flypast with these boys, landing my old 747 with 300 people on board will seem rather dull.

Jeffery Pike

DRIVEN TO DRINK



'Red Moon', Level 9, BBC B, £6.95

I'm getting cheesed off with this. Just as my self esteem is inching its way back to tolerable levels, whammo – I get another Level 9 adventure to review. View of own worth plummets. Afraid to meet the world, or even a mirror. All meals taken through a straw inserted in small hole in paper bag. It takes weeks before I pluck up enough courage to cut eyeholes in the bag.

What makes it worse is that *Red Moon* is supposed to be one of the easy ones. What a downer. They didn't send me a cheat sheet at first either. I was alone and incompetent.

I did find the crown right at the start but my sense of achievement was short lived. So was I. The arrival of the hints cheered me up a bit and I got into where I was supposed to, but then they leave you alone again – incompetent in a different place. I've been shrunk, expanded, incarcerated in the dark (it was awful), locked out of towers, locked in towers – how much can a delicate soul stand? I still don't know what it is that I'm supposed to be doing.

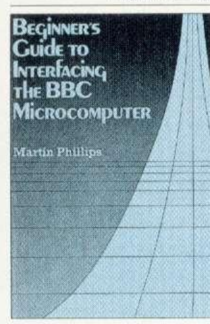
You may have gathered by now that I find this sort of thing difficult. I'm even finding speech a bit tricky after my experiences.

If you like being bamboozled and biting your nails this must be the one for you. If you're a real smarty, you may even find it not so hard. If you're heavily into SM you'll think it's a wow.

If you're like me, you'll want to retire to a darkened room and take up a new hobby – like heavy drinking under cover of a paper bag.

Harry Sinclair

FIRST STEPS IN INTERFACING



'Beginner's Guide to Interfacing the BBC Microcomputer', Martin Phillips, MacMillan, £6.95

At first sight, this could be mistaken for just another projects source book, and a slim one, with only three or so pre-defined projects. However, it has some features which make it stand out from the crowd of similar offerings.

This book really has been written for beginners. The first chapter defines a 'black box' approach to microchips which is carried through the rest of the book. The fundamentals of electronics are concisely introduced, and a simple Veroboard construction technique is outlined. A really useful addition is a minimum tools list and a suppliers list (note that RS Components don't sell to the public).

Interfacing has been restricted to the user port and the analogue port, and the functional descriptions of these are very clear.

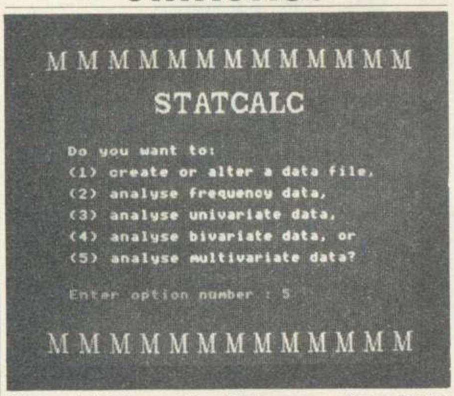
The projects themselves are not particularly innovative, but a neat idea is the use they make of motorised Lego.

I think this book's strongest point is that it introduces enough principles and concepts to allow the enterprising experimenter to design his/her own projects, instead of just copying them out of a book. I would recommend it as a back-up to one of the many other books of pre-designed projects for users who want to take interfacing seriously.

Mike Barwise

SOFTWARE

COMPARING STATISTICS



'Statcalc', Macmillan Education, BBC B (40 track disc with 16-page manual), £26.50; 'Statspak', Chalksoft, BBC B (two 40 or 80 track discs with 15-page manual) £17.50; 'Unistat Statistical Package', University Software, BBC B (40 or 80 track disc with 71-page manual), £85

At first sight these seem to be three very similar packages of disc based statistical programs but, although they certainly do overlap to an extent, there are major differences in what they can do.

Much the easiest is *Statcalc*, a very simple suite of eight programs designed to perform the elementary exercises required in two textbooks on statistics for geographers and earth scientists, by RBG Williams (of the University of Sussex). He is joint author of the *Statcalc* package with T J Browne.

Statcalc (pictured above) is easily operated and entirely menu driven, with one program which allows you to type in data with one, two or many variables and then add to them or make alterations; it can also deal with frequency data producing mean, median, standard deviation and simple tests of fitting data to a formula and testing it.

It will perform all this, calculate regression equations and also a range of correlations and tests of variance. This can be sent to most printers with very simple histograms (bar charts) but no graphics dump routine is included in the package.

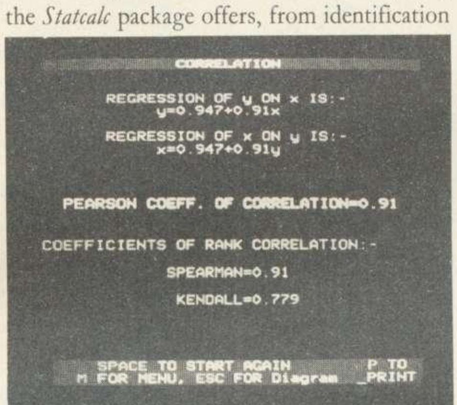
The whole *Statcalc* package is written in Basic so it is rather slow and clumsy; the print facilities are very primitive but it does contain most of what is needed for many of the social sciences, including economics or psychology at 'A' level.

The *Statspak* is quite different in many ways and much more sophisticated. It is designed mainly for teachers who want to create illustrative examples for students and includes all the procedures that are needed for 'O' and 'A' level (at all the examining Boards I can think of) for pure mathematics with statistics, geography or applied statistics but, as the author of the *Statspak* software, N Kirkby says: 'It is not designed to teach statistical theory from the beginning.'

In my view the publishers are being unusually modest in their claims because the suite does everything likely to be required up to the end of the first year at university for those who are not taking specialist courses.

It will also meet the needs of most teachers in the fields of engineering, the sciences and the social sciences.

The range of functions covers everything the *Statcalc* package offers, from identification



Statspak: designed mainly for teachers

of the properties of a series of numbers through range, total, geometric mean and sum of squares, variance, standard deviation, and the coefficients of variation and skewness. The options for frequency distributions provides equivalent information and then adds percentiles and deciles with the power to draw histograms, cumulative frequency programs and curves.

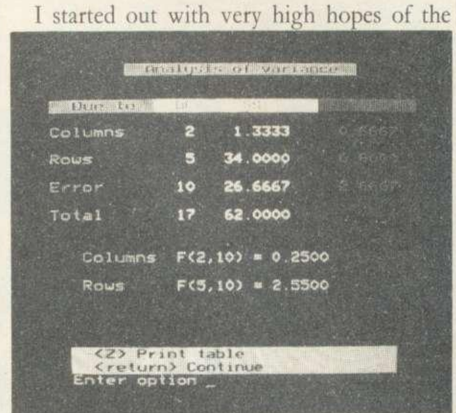
The options continue with a choice of correlation, regression and various tests including Pearson's, Spearman's and Kendall's with measures of fit.

It is very fast, uses standard presentation and comes with a second disc full of good examples to illustrate each process, and the diagrams are excellent on the screen or output on the Epson type of printer.

It is important to specify whether you want 40 or 80 tracks because it is very skillfully protected against copying.

Having said that, I have no hesitation in strongly recommending any establishment teaching statistics to have a copy – even if it does have to send it back to the publishers occasionally to be re-recorded. The package is excellent value for money.

I started out with very high hopes of the



Unistat: 'The Rolls Royce of statistical packages'

Unistat software which I had wanted to try since it was first published in 1984 and had long regarded it as the Rolls Royce of statistical packages. It was designed as a 'tool in the analysis of data in most branches of science, including medical and social sciences, economics, engineering, etc'.

The package was originally written for the Sinclair ZX and rewritten for the BBC B.

The package consists of four menu driven programs concerned with descriptive statistics, frequency distribution and histograms; statistical tests, correlation coefficients and probability distributions; analysis of variance, scatter diagrams and time series plots; and multivariate regression.

Much of what is available in *Unistat* is a repeat of what can be found in the previous package with the addition of the students' t test, Mann-Whitney and Wilcoxon's tests and much more on the significance of results. The analysis of variance and the curve plotting is very good, as is the scaling.

Finally the whole section on multivariate regression is much more advanced than in the previous package, *Statspak*, although it does stop short of factor analysis which would require too much memory.

If these features are important to you then there is no comparison.

Printing facilities are also more flexible, and the manual more detailed and rather easier to follow than the others'.

These are very different packages designed to do jobs which only you can compare with your needs. In spite of that, the quality and price of the *Statspak* make it stand out – unless you really need the extra facilities of the others badly.

Roger Carus



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SOFTWARE

INTER INFORMATION

Roger Carus investigates the first packages in Computer Concepts' planned series of integrated software

These two ROM-based programs for the BBC micro represent a real advance on past software in many ways.

They work on the model B and later versions of the Beeb with a variety of popular DFSs and shadow RAM boards, but not fully with a second processor although a disc program at £4.95 gives a partial link.

InterSheet, at first sight, is a conventional spreadsheet program which can process numeric data presented in rows and columns. It consists of two ROMs with fitting instructions, a 28-page introductory manual, a reference manual with 53 pages, a vital four-page leaflet containing updates and corrections, a quick reference card and a function key strip. The second ROM provides links to other software in the series and it is this that makes the package unique and of special interest.

InterChart belongs to the same family, and creates charts and graphs from numeric data, independently or in conjunction with the sister program. It comes in a similar pack with one ROM (since you are assumed to have the other), a reference manual with 78 pages, a reference card and a key strip.

As BBC micro spreadsheets go, *InterSheet* is a good one, able to work with 64 columns of 255 rows, although few users need anything like so much.

In any case the memory would not support more than a fraction of these 16,320 boxes in use unless you have a huge extension, and then it would be very slow. More importantly, you have a choice of modes and can choose 40, 80 or 105 characters width (figure 1), although reading the last without a large high definition screen is almost impossible.

InterChart can produce bar charts, pie charts and graphs from numeric data on one or two axes, with a variety of colour and cross-hatching, and the forms of presentation can be changed quickly and easily. I have seen almost every one of the techniques in separate disc-based programs but never together in one ROM. I confess to having had childish enjoyment in playing with the variations in presentation which it can offer.

The theory behind inter-linked ROM packages is very simple – many of the applications for micro computers call for the use of a mixture of spreadsheet, database, word-processor and the illustrative charts which help them to make sense. Suppose, as I did recently, you take a list of Government ministers with information about them, and store it in a database. You then want to compare their ages on reaching Parliament and taking office, so you take a spreadsheet. To write a report on the patterns that appear, you need a wordprocessor, and finally, to illustrate the conclusions and break up the report you want diagrams showing comparisons, so you need to produce bar charts and pie charts, with trend lines on continuous curves. To do all this with the minimum of trouble you want to be able to call in the data as you require it.

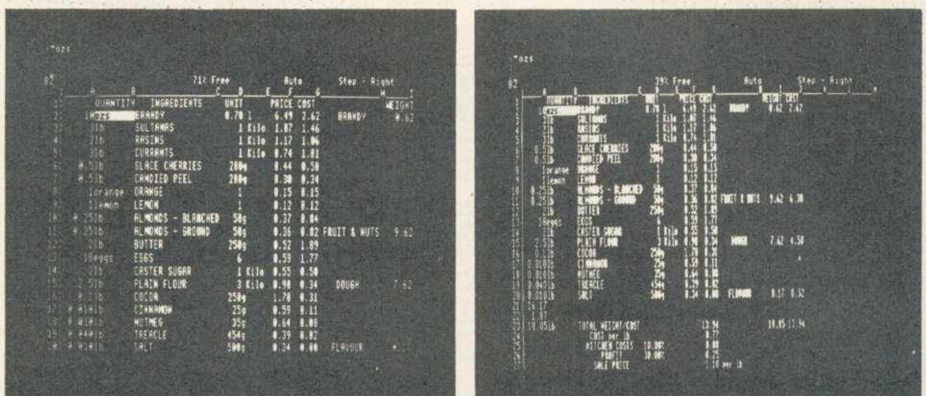


Figure 1. InterSheet allows you a choice of modes so you can choose to work with a screen of 40, 80 (left) or 105 characters width (right)

In computer terms you want to be able to use the same data by drawing on the same files and applying different programs to analyse and display it effectively, and this is what the ROM-link packages do.

The second ROM in the spreadsheet package translates the data into a common format which each program can use. The advantage of having them all in ROM is that you can have them dormant in your micro until required.

The facilities of *InterSheet* are very similar to those of other spreadsheets. It can save and load tables of inter-related figures which are entered from the keyboard with a wide variety of formats, and then print them using an Epson compatible printer or spool them for use in hard copy form. There is great flexibility in format, number of significant figures shown and presentation. The function keys are used to speed the processes with more rapid commands, and a full range of mathematical functions is permitted. What is different is the ability to use the ROM-link to 'export' data in a form which can be used by other programs in the family, and to 'import' from other operations. It also allows the user to keep as many as 16 files from the different programs resident in memory at any one time.

InterChart is able to display data either keyed in direct from the keyboard or transferred from files belonging to other members of the Inter family. The presentation can be in labelled bar and pie charts, or continuous line graphs. It is easy to alter the mode, as well as the colours and use of hatching, once the data is entered.

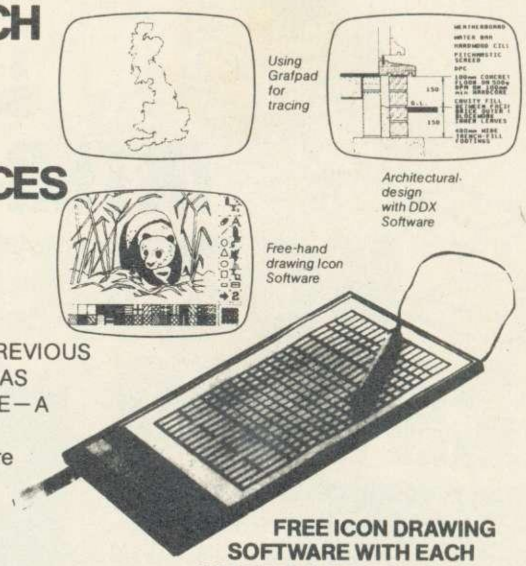
Headings can be input and the related graphs overlaid to show comparisons. All the instructions and manuals are commendably simple to follow. The graphs are self-scaling and so make the maximum use of the screen. The X and Y axes can be changed, as can the scales, even permitting logarithmic presentations.

Most users will be particularly interested in the ease of use and there is not much doubt that it would be simple to start from the beginning and get good results.

There are some minor difficulties and irritations which cannot be ignored. At first I thought there was something wrong when I followed the instruction book and typed in '*ISHEET' and was prompted to use the systems disc. It appears that command is

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correct if the *InterLink* ROM is fitted, but I was using an external ZIF socket to avoid disturbing my ROM board, so it was absent. After studying the update sheet I found that I should be using *SHEET.

My second discovery was that 'B' can stand for Box (or cell) and also for Blank, so careless responses to prompts can blank out a box or even a row. Being used to *Ultracalc 2* where this does not arise, I cleared a few boxes!

Other impressions were that the 'HOLD' facility for fixing column and row titles or entries to produce windows, though clever, was rather clumsy. With *InterChart* I could find no faults.

In addition to my usual tests I produced a spreadsheet (figure 2) showing the quantities and ingredients of a rich fruit cake with prices to manipulate and to convert to charts (figure 3). After a little practice it came right but I found that I could do a better, neater and quicker job by taking the programs separately. Devising titles to fit both formats was very difficult indeed.

I decided that designing a program to fit with the *InterLink* idea had imposed constraints on the operation which made for more roundabout methods than usual. The extensive use of brackets and colons in making entries became irritating, and I never fully mastered the art of relative replication of areas which is central to the spreadsheet idea.

Those considering buying these packages will want to know how well the ROM-link idea works and I have few reservations, once you have mastered the instructions. It is more difficult to decide how useful it is – that will depend on circumstances. If you want to transfer data between programs you can, but often you will want to change headings.

More seriously, you have more keying to do so there is greater scope for errors, and it certainly adds to the number of commands you must remember which would be a nuisance if you did not use it frequently.

Because there is the facility for spooling text it is possible to use the Basic programs with *Wordwise Plus* or *View* wordprocessors but the data does not transport to other spreadsheets, so far as I could find, although it would be easy to type in the key figures to produce charts.

InterChart might be useful if you make extensive use of charts, for example in writing books, and are prepared either to use its formats or treat them as drafts. Whether it makes sense for business use is more doubtful, and the same goes for home use. It's correctly claimed in the advertisements that it is quicker than the competitors but that does not take into account the time needed for more learning and keywork.

It is not as easy to use *InterSheet* as *Ultracalc 2* and it's less versatile than *ViewSheet*, particularly in the provision of real 'windows' for displaying results.

The idea remains a good one but I suggest that it might be wise to wait and see the planned database (to be called *InterBase*), and the wordprocessor *(InterWord)* which promises the best of *Wordwise* together with 105 columns. If it gets that right then Computer Concepts has a real winner, even at £217 for the series.

'InterSheet', £56.35 and 'InterChart', £36.80, Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933

QUANTITY	INGREDIENTS	UNIT	PRICE	COST		WEIGHT	COST
10ozs	BRANDY	0.70 1	6.49	2.62	BRANDY	0.62	2.62
3lb	SULTANAS	1 Kilo	1.07	1.46			
2lb	RASINS	1 Kilo	1.17	1.06			
3lb	CURRANTS	1 Kilo	0.74	1.01			
0.5lb	GLACE CHERRIES	200g	0.44	0.50			
0.5lb	CANDIED PEEL	200g	0.30	0.34			
1orange	ORANGE	1	0.15	0.15			
1lemon	LEMON	1	0.12	0.12			
0.25lb	ALMONDS - BLANCHED	50g	0.37	0.84			
0.25lb	ALMONDS - GROUND	50g	0.36	0.82	FRUIT & NUTS	9.62	6.30
2lb	BUTTER	250g	0.52	1.89			
18eggs	EGGS	6	0.59	1.77			
2lb	CASTER SUGAR	1 Kilo	0.55	0.50			
2.5lb	PLAIN FLOUR	3 Kilo	0.90	0.34	DOUGH	7.62	4.50
0.1lb	COCOA	250g	1.70	0.31			
0.010lb	CINNAMON	25g	0.59	0.11			
0.010lb	NUTMEG	35g	0.64	0.08			
0.040lb	TREACLE	454g	0.39	0.02			
0.010lb	SALT	500g	0.34	0.00	FLAVOUR	0.17	0.52
16.17							
1.87							
18.05lb	TOTAL WEIGHT/COST			13.94		18.05	13.94
	COST per lb			0.77			
	KITCHEN COSTS	10.00%		0.08			
	PROFIT	30.00%		0.25			
	SALE PRICE			1.10	per lb		

Figure 2. A spreadsheet showing the quantities and ingredients of a fruit cake

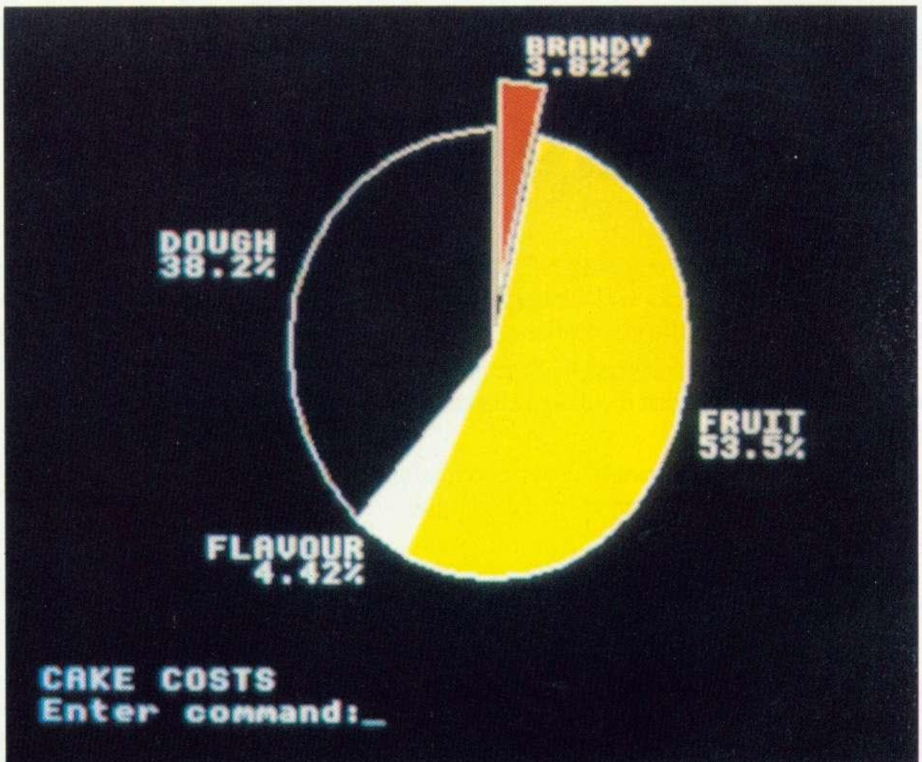


Figure 3. A pie chart produced by the data in the spreadsheet above



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HARDWARE

BRANCHING OUT FOR BUSINESS

Roger Carus gets to the root of Pear Tree's version of the Beeb



Pear Tree's KBL128 PC system: a modified Beeb with built-in wordprocessor and accounting modules

Enthusiasts have always welcomed the logic and simplicity of the BBC micro, but wished for extended memory and a smarter, more business-like appearance. In the last year there have been real improvements and the number of small business users has grown rapidly.

Now Pear Tree Computers is marketing a version of the Beeb which aims to satisfy both these needs. With a built-in wordprocessor and supplied with a wide-ranging suite of accounting modules, it has much to offer, so how do the business capabilities measure up to the likely requirements?

It's fitted with Acornsoft's *View* wordprocessor which is a reliable and well tried system which you can read about in the comparative review of wordprocessors by Jacquetta Megarry (January 1985) as well as in several articles in the September 1985 issue of *Acorn User*.

The wordprocessor does not appear to be integrated into the business system generally, but stands alone, which is unusual these days when 'portability' of data calls for a system which can take, for example, a section such as the monthly profit report out of accounts and insert it in a wordprocessed chairman's report. I would have expected there to be a means of spooling text for transfer but this does not seem to be the case.

Accounting

In the accounting related areas the system integrates quite well and performs all of the functions so far available for the BBC micro. It is menu driven throughout, and reasonably easy to follow. Security is provided from the outset and I tried hard to find a way round it without success – you really do need to remember the password correctly. Frequently used information such as your company address, telephone and VAT numbers are entered once and for all.

You get a comprehensive suppliers database which is particularly user-friendly and holds data on 1100 suppliers, while the purchase ledger itself performs every task I could think of and takes 2050 transactions on a single disc side, with access in around one second. The option for recording 'Remittances and payments' is the best I have seen.

On the sales side there is an equally extensive provision with a customer database sufficient for 1100 clients, closely integrated with the sales ledger. This holds 2050 transactions and invoicing (with credit notes) units as well as a stock control able to hold data on about 1350 different items.

I'll take the sales ledger as an illustration of one module and show what it offers in detail. The unit menu offers you eight choices. The posting option allows you to insert a customer's invoice into the system. On payment of the account the second option prints receipt slips, updates the customer's account – even in the case of partial payment of multiple accounts from the same customer.

The third option produces and prints statements for individual customers, and then provides VAT records. The option for listing overdue accounts follows, with a facility to input individual accounts. There is then a process for credit notes and a summary procedure to close the sales ledger at the end of the chosen period.

The sales ledger is representative of the degree of detail offered by each of the modules and they appear to work well and to integrate where it is important.

They compare favourably with other packages I have seen.

On the purely accounting front the nominal ledger does not appear to be fully integrated, although this is not very important, and it has its own printing section which can produce postings, trial balances and profit reports as well as simple charts from these figures.

A useful and unusual petty cash control unit covers the need for internal book-keeping. There is also a module for bank account control which is likely to be enough for almost any small business, but which strangely seems to make no provision at all for working in foreign currency.

The final program in the suite (and the disc has 26 files) is one for producing proforma quotations which would be ideal for a business such as a small builder or other contractor who needs to create confidence when presenting estimates to public bodies.

It is a satisfying and comprehensive business package if these are the functions you need to

PHOTOGRAPH BY DAVE KING

carry out, but I do have some reservations about features missing from it.

Apart from the problem of portability and its lack of integration, there is no database, spreadsheet, forecasting package, spelling checker (for the wordprocessor) or proper chart production unit.

It is perhaps a little unreasonable to look for all these features, and they could easily be added (although there are no explicit details about the number of free spaces for additional ROMs), but a package of this price should include them already.

Given the complexity of the system, I would also like to have seen a free training day offer – I certainly would need one before entrusting my records to it.

The manual is commendably brief at 38 pages but left me with a number of quite important questions unanswered. Oddly there is an excellent summary with capacities and access times, as well as the extent of integration, which is produced by Pear Tree as part of its marketing material, which gives almost all this information. It would have been sensible to have included it in the guide as an appendix.

Master

The model tested was based on the BBC B+ with 128k, fitted with operating system 2.0, 1770 Acorn DFS 2.20, ADFS 1.30 and *View* 3.0. As I was finishing this review the BBC Master was announced and this will be the basis for future issues of the KBL128 PC.

The first consequence of all the built-in software in the operating environment is that the micro does not 'feel' like an older BBC model and the various systems each modify what an experienced user is accustomed to. When these are taken into account together with the different arrangement of the keyboard, which is similar to that used by IBM, the confusion grows even more.

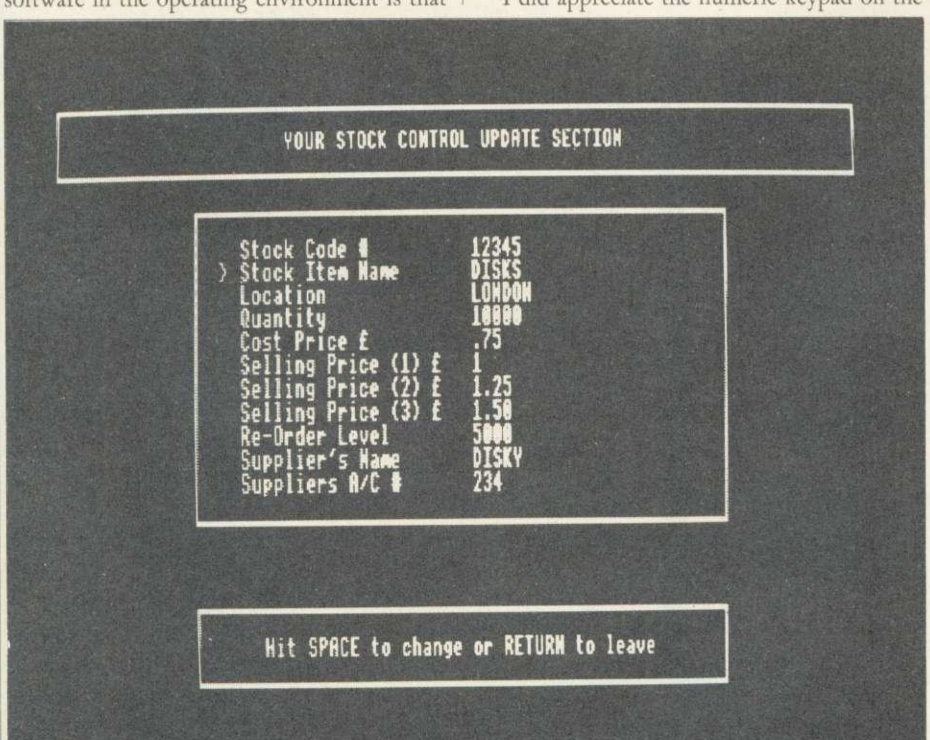
Of course you can sort it all out with the helpful manuals, and that brings you to the next problem because there's a total of 920 pages of micro, DFS, ADFS and *View* user guides to read (each with supplements and corrections), in addition to Pear Tree's guide, mentioned earlier.

Stock control	6
Customer database	8
Purchase ledger	8
Sales ledger	8
Nominal ledger	6
Invoicing and credit notes	8
Proforma quotations	10
Petty cash control	6
Bank A/C control	7

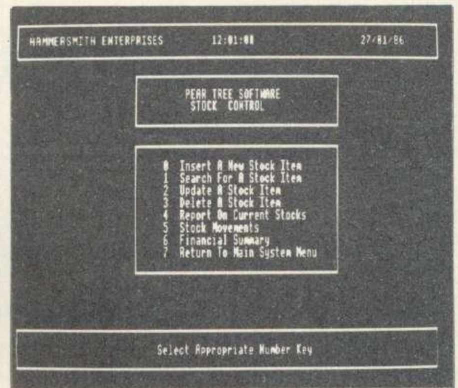
Table 1. The accounting modules scores out of 10

The layout of the keyboard is important because moving Shift Lock to where you expect to find Shift and also Caps Lock to where the second Shift key should be makes for mistakes and slows typing. Surrounding Return with a forest of keys also creates confusion. This doesn't matter if the operator uses no other machine, but that can scarcely be guaranteed.

I did appreciate the numeric keypad on the



Updating an entry in the stock control module



The stock control module's main menu

right-hand side of the keyboard and see that it is also a feature of the Master model. This is ideal for accounting and figure work and made me all the more sorry that there was no spreadsheet provided, which would integrate well with the module providing quotations.

Conclusions

I rate the modules in the accounting software package in table 1 (marks are out of 10). This represents good quality business software compared to others on the market and I can recommend it.

However, the cost of the package including the hardware is less attractive. Comparable items to those featured in this system, according to current price lists, cost:

BBC B+ with 128k	£459
ADFS	£33
Cumana 800k CD800S	£252
Kaga 1201 G high resolution green screen monitor	£104
View wordprocessor	£69
Epson LX 80 dot matrix printer	£270
Total	£1187

As this package is selling at £1460 plus VAT or £1679 inclusive, you are paying at least £492 for the software and the repacking of the hardware in an IBM look-alike format.

The system has the advantage of offering operating systems in French, Greek and Arabic as well as English so it could be competitive in the export market.

My advice to prospective buyers is it is a good comprehensive business system and, if you are familiar with the BBC B and do not mind making the effort to understand how the Pear Tree works, you can buy it with confidence. If you already have a BBC-based system which works but are tempted to upgrade it, then there are easier ways of doing so. For the novice thinking of purchasing a system for business use, then this one is probably too complicated a choice.

KBL128 PC System, £1460 plus VAT, Pear Tree Computers, Falcon House, High Street, Huntingdon, Cambs PE18 6SS. Tel: (0480) 50595.

HARDWARE

FAIR SHARES FOR PRINTERS

You can link up lots of micros to one printer or lots of printers to one micro with Keyzone's products. George Hill puts them to the test

The Keyzone Printer Changer allows the use of more than one printer from one micro. The Printer Sharer allows the use of one printer from a number of micros. Both are small (6 x 4 x 3 inch) grey boxes with cheap black plastic knobs to operate the switch and four 24-way sockets (like the Beeb's printer socket).

Savings

These devices are for the sharing of centronics-type parallel outlets and printers, and as such should be very useful in school or college computer rooms where sharing resources can provide a significant saving in hardware costs.

There are a number of such devices on the market, ranging from very cheap switches to this relatively expensive box incorporating a printed circuit board and several chips. The exact nature of the circuitry is not revealed in the brief instruction booklet. It contains chips which clean up and reconstitute the signals on the wires, but no memory buffering. This means that the cable lengths which can be employed without transmission losses occurring are far in excess of those which could be used with a simple switching device. I was provided with a 10m cable length, and experienced no problems with it in a computer lab.

Connections

I tried out the Printer Changer at home with various printers and the only difficulty arising was the expected one of obtaining perfect cable connections involving about 100 wires! (LEDs light to show which device is connected.)

I was able to switch printers without disturbing the micro, and I would recommend the purchase of this device to anyone who has both a dot-matrix printer for quick drafting and a daisy-wheel for final high quality output, or if you who have both printer(s) and plotter(s).

The Printer Sharer is well suited to school or college use. I tried it on a level 2 Econet system with an Epson FX80 printer attached to the 'printer server' – through which all stations can print. Any attempt to operate graphics dumps over the Econet severely clogs up the system, owing to the large amounts of data to be transferred. It was therefore useful to be able to operate the printer 'locally' from two other stations for a graphics dump, or for any other extensive printing task. Figure 1 illustrates the layout.

There were some initial problems, due to faulty cables caused by poor connections between wire and plug. Two out of four cables supplied had this fault, but supplies are now from a different manufacturer, and it is hoped they are more carefully checked for quality. Once these problems had been overcome it worked well and was a great convenience.

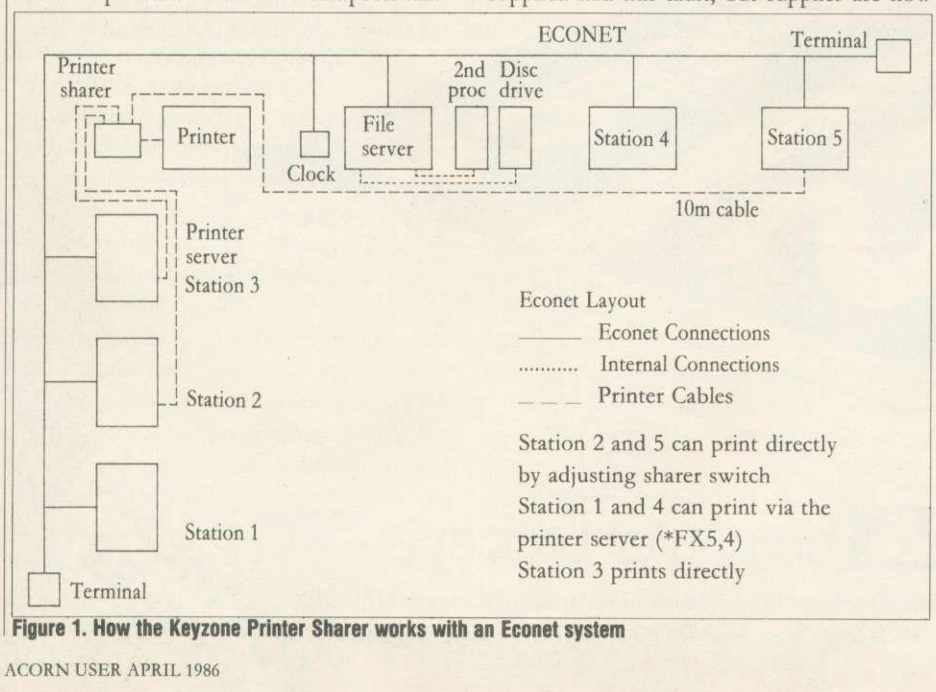


Figure 1. How the Keyzone Printer Sharer works with an Econet system

Criticism

There are some points to criticise on the original models. One is the difficulty of having to obtain a 5 or 12v supply from somewhere. This involves soldering, or using the socket under the Beeb – and mine is already taken up! I soldered the wires provided to the back of the VDU plug, following the instructions. This is not the happiest of solutions, but I could not see an easier way.

The latest versions of the devices include separate power supplies, and only allow the use of 12v, not 5. This is a better solution, but there is now the extra problem of finding another 13A socket and the inconvenience of another trailing black box.

There are no LEDs on the Printer Sharer. This means that you have to examine the box quite closely to determine which micro is currently selected. The three outlets on the changer are somewhat whimsically labelled as "PLOTTER1 GRAPHICS2 PLOTTER3" – I wish I had two plotters!

On earlier versions of the devices the pointer on the switch did not line up with the destination labels, causing some confusion. A redesigned circuit board has corrected this defect in the latest model.

All in all, these are useful and safe devices offering significant savings in cost in multi-user environments.

Since this review was written Keyzone has changed some of the features of its products. A modified separate power pack is included at no extra cost, the PSU is now built into the mains plug provided and the DC connectors have been removed and a hardwired mains lead and power supply are now fitted.

Printer Changer, £60 (one micro to three printers), £95 (including interlinking cable); Printer Sharer, £60 (three micros to one printer), £75 (including interlinking cable). BBC B, B+ and Electron, Keyzone Ltd, Regeneration House, School Road, London NW10 6TD. Tel: 01-965 1684/1804.

THE NEW SPEECH SYSTEM

The addition of a new TEXT TO SPEECH ROM to our already successful SPEECH ROM provides the most powerful and comprehensive speech system available for the BBC Micro.

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*SAY Hello, I'm your computer speaking.

will make the computer say precisely that, with the correct intonation and stress.

The system consists of two ROMs. Firstly our normal speech ROM which controls the speech synthesiser in the Micro. This allows text to be entered in a phonetic fashion and allows very subtle control over the intonation of any words or sentences. This also has a unique singing feature so it is possible to specify the phoneme and the note.

The second ROM contains the text to speech conversion routines. This uses the most advanced algorithms available and converts any English sentence to speech, so it is better at coping with strange English pronunciations. This means that this system speaks in the most realistic manner possible and quite unlike normal monotonous speech systems.

Flexibility beyond anything else available.
A few examples:



*SAYIP. Will make the system speak any input from the keyboard. Text may be spelt on a letter by letter basis or spoken a word at a time.

*SAYOP. This will speak any text sent to the screen.

*SAYPRT. This intercepts the printer output so that it can speak listings etc, rather than printing them. CTRL-B and CTRL-C turn the speech on and off in the same manner as the printer.

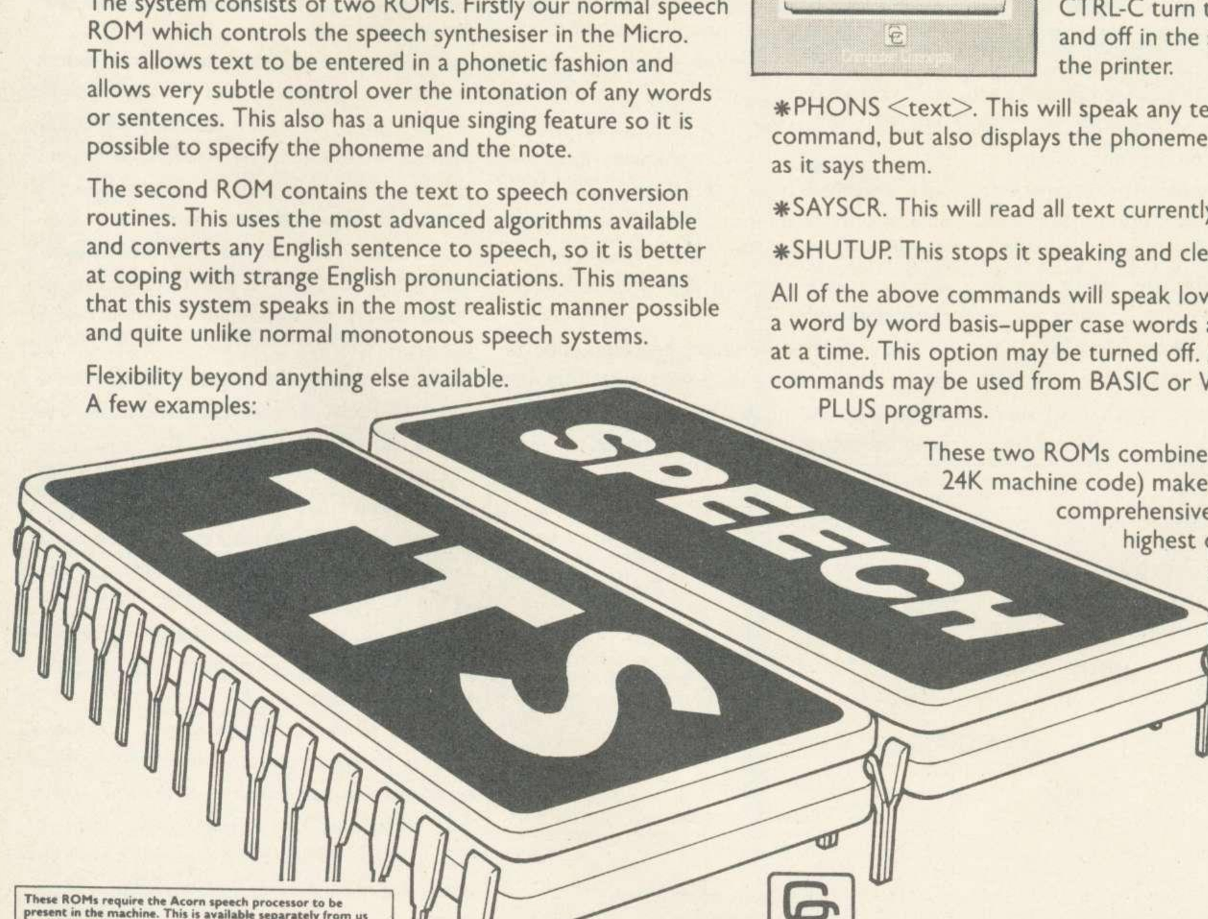
*PHONS <text>. This will speak any text following the command, but also displays the phonemes of the words as it says them.

*SAYSCR. This will read all text currently on the screen.

*SHUTUP. This stops it speaking and clears all buffers.

All of the above commands will speak lower case text on a word by word basis–upper case words are spelt a letter at a time. This option may be turned off. All these commands may be used from BASIC or WORDWISE PLUS programs.

These two ROMs combined (a total of 24K machine code) make this the most comprehensive and the highest quality speech system available for the BBC Micro.



These ROMs require the Acorn speech processor to be present in the machine. This is available separately from us for £10.00 incl. VAT.

Like all ROMs this is a simple plug in device that requires no soldering.

Please state clearly when ordering if you require the SPEECH PROCESSOR.

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Access

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FOR THE BBC MICRO MODEL B, B+, B+128

REVIEWS

HARDWARE/BOOKS

ARMED WITH INFORMATION

Seiko RC-1000 Wrist Terminal, £89.95

James Bond probably has one, Luke Skywalker surely must, and now I have one too. It's straight out of the movies and every science fiction addict's dream. 'What is it?' you're asking. Well it's a watch, but like no other digital watch you've ever seen. It connects to the BBC micro and provides you with telephone numbers, diaries, timetables and lots of other information, but, if you must be conventional, it can also tell the time.

The Seiko RC-1000 Wrist Terminal uses the BBC micro as the source to enter information into the watch, and can hold up to 2k of data. Now this may not seem much but in practice you can have a maximum 80 screens of information, each consisting of 24 characters split over two lines of liquid crystal display.

The RC-1000 comes with its software and a lead to connect the watch to the RS423 port on the Beeb. The communication between micro and watch is one-way only with the Beeb transmitting data to the RC-1000.

Data can be formatted in one of four ways – schedule alarm, weekly alarm, world time and memo data displays. The first two options allow the watch to provide preset alarms months in advance or a regular weekly alarm. Both offer the user the ability to store a 12 character message along with the date and time. The watch can store the time for up to 80 cities in the world.

The last option is the most flexible and allows the user to display memo data to his or her own configuration. For instance I used the available space to store telephone numbers, reminders, train timetables and a diary of important dates. I must admit I had my doubts as to the usefulness of the watch but was pleasantly surprised at the amount of information I could store and how many times I used the watch. Having a list of personal and business telephone numbers on my wrist proved a great asset.

My only complaint is that there is no way of sorting information into alphabetical order. To find an entry you must first scroll through the file headings (eg, birthdays, diary, telephone numbers, etc) and then scroll through the information within the specific file. This can be time consuming.

The software was written by A&F Software for Seiko and is fairly straightforward to use. Seiko provides a general instruction manual and another for the software but you're better off working it out yourself. Once loaded, the screen display is split into two main sections – the upper third of the screen shows a menu of options, the lower part displays the lines of data to be entered into the watch. This screen can be scrolled in either direction using the cursor keys in order to show all 80 data lines.

All options are clearly displayed on the menu screens and entering data makes use of pressing two keys (the CTRL button and an



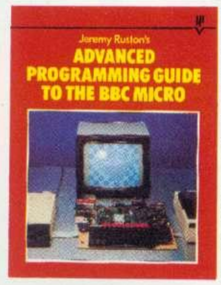
alphabetic key). The function keys are used for changing dates and times in conjunction with the weekly and schedule alarm modes.

The idea behind the software is simple. The user creates files of data which are called 'labels'. Under each label the user can create lines of information, which are transmitted to the watch via the RS423 port. It may sound complicated but in practice it's quite easy.

So, is this watch just another gimmick or does it fulfil a need? It has some useful applications, such as to remind diabetics of times and dosages of medicine to be taken or to provide a schedule of meetings in the office. The major drawback is that data can only be entered or changed from the micro but if you use your Beeb regularly then this should be little trouble.

If you've got the money to spare and have a need for information at hand (literally), then the RC-1000 may be of use. It has its limitations in data storage and display but it's a great talking point at parties! **Jeremy Vine**

SLUG, FROTH AND MULTIPLY



'Advanced Programming Guide to the BBC Micro', Jeremy Ruston, Interface Publications, £7.95

Jeremy Ruston has become one of the 'names' in computer book authorship. His first claim to fame was the *Ruston Compiler*, which took some BBC Basic keywords and translated them, in a fairly haphazard manner, into machine code.

This 'new' book is largely composed of sections of an earlier work, *The BBC Micro Compendium* (the name is still at the top of each page), which had to be withdrawn because it included 'secrets of the Basic ROM'. This was one of its selling points, and succeeded in attracting rather too much unwelcome attention from Acorn.

What remains is a peculiar mix of instruction, diversion and compiled languages.

Chapter one runs quickly through assembly language and how the 6502 is structured. This is a good, light treatment, but its length inevitably means it lacks detail. Chapter two constructs machine code arithmetic routines, and is followed by a chapter doing a similar thing with Boolean arithmetic. The next chapters tackle floating-point arithmetic and evaluate some interesting expressions.

The fun really starts in chapter six. This and the next section introduce two Ruston languages, with the unusual and vaguely repulsive names of Froth and Slug.

The first of these is a variant of Forth, a threaded, interpretive language, which means it isn't complied in the true sense. If you're fed up dabbling with Basic, you could do worse than to type in and play around with Froth.

The second language, Slug (an acronym for the modest 'language with universal greatness'), is a Pascal-ish language with a reasonable amount of flexibility. It is sufficiently like BBC Basic to be used from scratch, and compiles to code which runs between 10 and 60 times faster.

The two languages are worth having for the price of the book. The rest is rather too maths-oriented for general consumption.

Simon Williams



ILLUSTRATION BY RICHARD PARENT

HARDWARE

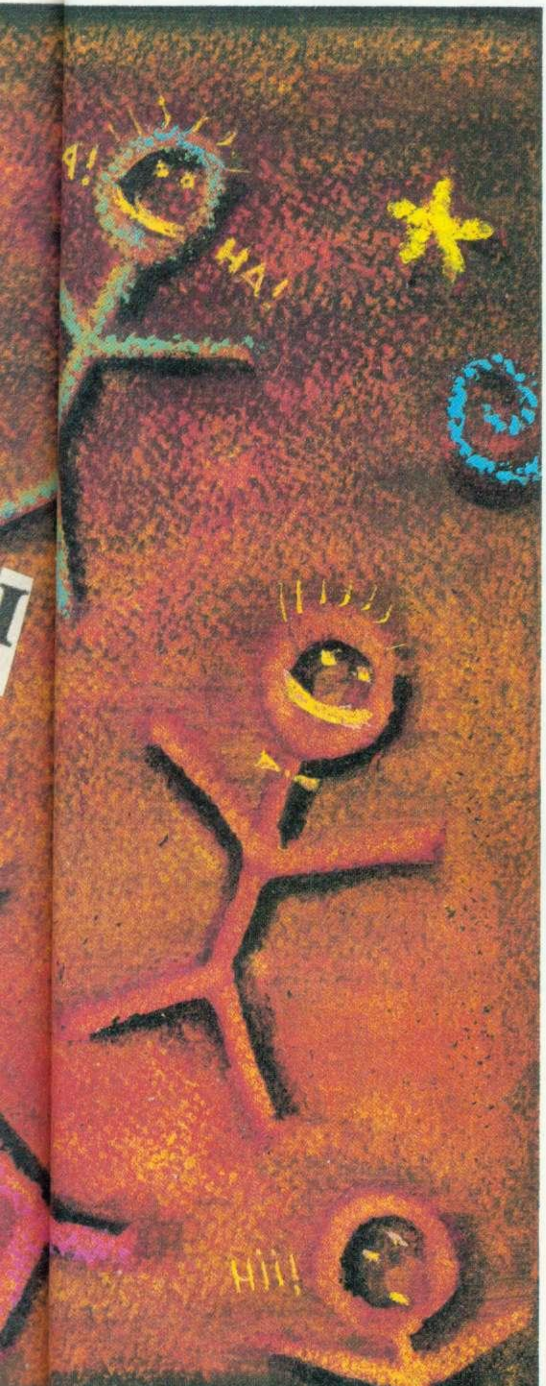
TECHNICAL TALK

Martin Phillips compares three speech synthesis systems for the Beeb – take your pick according to your application

One of the most innovative features of the BBC micro was, and still is, the provision for speech synthesis, yet it has been virtually ignored until recently. The Acorn speech synthesiser has not achieved great acclaim, and several other inexpensive systems that have been produced have proved almost unintelligible except to the practised ear. Recently, two interesting developments have come along – Computer Concepts' *Speech* ROM which uses the on-board speech synthesiser but extends its vocabulary without a great loss in quality, and Cambridge Microcomputer Centre's Namal Type and Talk speech synthesiser which requires almost no programming.

Speech can be recreated by recording certain words and processing them so that they can be represented as a series of numbers, which are turned back into intelligible words again. This method can achieve a high quality of reproduction but you are limited to the words already stored in the system. It's not a perfect system, because words have various inflections when used in different parts of a sentence. To do this system justice, phrases or sentences would have to be recorded, thereby increasing the problems of storage and access. This is only realistic where the application is limited to a few sentences, such as in cars where speech systems are used to warn of faults.

Human speech is considered to have a practical upper frequency of 4kHz. In order to store speech, digital sampling of the analogue



signal is required to be performed at a rate of 8kHz. Each sample will need to be resolved to 12 bits, which gives an approximate data rate of 100,000 bits per second! In more practical terms it takes 20 seconds to utter six English phrases averaging six words each. This implies a memory storage of two million bits of data. A BBC micro would be able to store just two seconds of speech using all its available memory at this rate. To make speech synthesis a practical proposition, therefore, special techniques have been devised to reduce the amount of memory needed to store a sound – this is the way the BBC speech system works.

The alternative is to break English speech down into its component parts (phonemes) and then reassemble them to make up words. There are just over 40 phonemes in ordinary English, and of course other languages such as French or German will have different sets and numbers. The advantage of the phonemes system is that any word can be constructed by putting together these voice sounds. The disadvantage is that the words don't sound real as it's difficult to give the phoneme the inflection its position in the word demands, and so the result sounds rather artificial.

One is left with a compromise, either to use a limited vocabulary of high quality speech, or to have a wide vocabulary of rather stilted speech. Here one must examine the reasons for wanting speech on the computer before making a decision on which system you want.

In the near future, speech synthesis will be used to give audible instructions or warnings on machines or equipment. These applications demand a system that has a limited vocabulary, yet is easy to comprehend. On the other hand, a wide vocabulary is required, say, to use the computer as a spelling tester, but the speech would also have to be very clear.

Provision for speech has been made on the circuit board of the Beeb. There are two vacant 28-pin sockets near the keyboard close to the power supply, designed to hold the Texas TMS 5220 voice synthesis processor and the Texas TMS 6100 voice synthesis memory.

The upgrade for the speech synthesis system comprises these two integrated circuits, another multi-way lead from the main circuit board to the keyboard circuit board, a socket on the latter board and a cover positioned at the left-hand side of the keyboard for access to the socket. One purpose of the socket is to allow extra speech memory modules to be plugged into the computer. Once installed, the speech system uses an existing Basic statement, SOUND, and does not affect the normal working of the computer. Early computers (issue 3 boards) require some modification to them before the system will function correctly – the instructions are provided with the kit, but it's not an easy job. Issue 4 boards on do not need any modification and it's an easy job once you find which chip goes where, as the documentation is not clear.

The synthesiser is simple to use, requiring only straightforward commands to produce spoken words. The speech system has been modelled on the voice of the BBC broadcaster Kenneth Kendall, and the quality of speech is very high.

The disappointment of this superb, but very limited system, is that Acorn has never introduced more speech modules to increase the vocabulary, and make the system more useful. The system is designed so that different memory modules can be accessed. The Acorn system is limited to a vocabulary of 165 words and part words, which allows few applications – really only useful for number work, as it can be programmed to count correctly up to one million. The system will say each letter of the alphabet, so you might think it's a superb system for teaching children the alphabet except that it says 'ay' instead of 'ah' for 'A' etc. At the moment there is very little software to support the Acorn speech system.

The Computer Concepts *Speech* ROM is really exciting. It requires the on-board Acorn speech processor, the TMS 5220, but not the associated speech memory ROM. The Computer Concepts ROM drives the speech processor directly, and is even able to adjust itself to cope with the fault on early circuit boards already mentioned. The *Speech* ROM needs two pages of memory to operate, and therefore it has to be enabled before use. This is a much more sensible system than, say, the Econet chip which grabs its memory and then you have to claim it back if you are not using it.

The *Speech* ROM comes with a 64-page handbook which is quite easy to follow, although a few more simple examples at the start would be helpful. It's quite straightforward to program and there are lots of examples to illustrate some of its very advanced features. The quality of sound is not quite as good as that of the Acorn Speech system, but is still very good, and there is no difficulty in understanding what has been said. I was most impressed with the error message system which makes debugging much easier.



All in all a cheap, simple system that is easy to program, with a high quality speech output.

The Namal Type and Talk speech computer is very different from the other two systems. For a start it's a self-contained speech unit with its own amplifier and speaker, but its major feature is that it does not need programming. It will 'say' any words sent to it, in much the same way any words sent to the printer will be printed. This, therefore, has the advantage that once the speech computer has been enabled, it does not need any programming commands to speak any words sent to the screen.

The speech computer comes with both serial and parallel input, and either can be used with the BBC micro. First you must plough through all the details of DIP switch settings in the handbook. I wonder how many Beeb users know whether the serial port has odd or even parity, let alone how many stop bits? Having worked this out and checked the switch settings (they were actually set for a BBC micro, but there was no note to say so), I tried

to discover how to use the system. It's actually very easy but you would never know that from the manual! In the end I struggled for some time, checking and rechecking, before finding the connecting lead was at fault, and not the DIP switches or the programming.

With the serial printer port enabled, and the printer option on, the Type and Talk repeated everything that was printed on the screen. Its 'voice' is electronic, but usually intelligible.

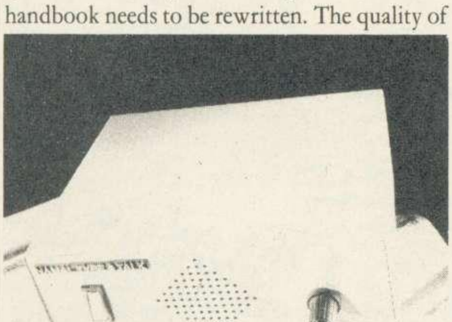
Such a simple system is forced to have its drawbacks, and this one is no exception. It translates each sequence of letters into recognisable words, but the English language is not to be tamed so easily. The Type and Talk cannot differentiate between words spelt the same but pronounced differently (eg, wind), but it does a creditable job in most circumstances. It's possible to alter the pronunciation of such words by programming it first.

Of the three systems, the BBC speech system at its full price of £55 is expensive, although it does offer high quality speech, but its limited vocabulary restricts its application.

The Computer Concepts *Speech* ROM priced at £33 (plus £10 for the BBC speech processor ROM, if required) is a far more versatile system than the BBC alone.

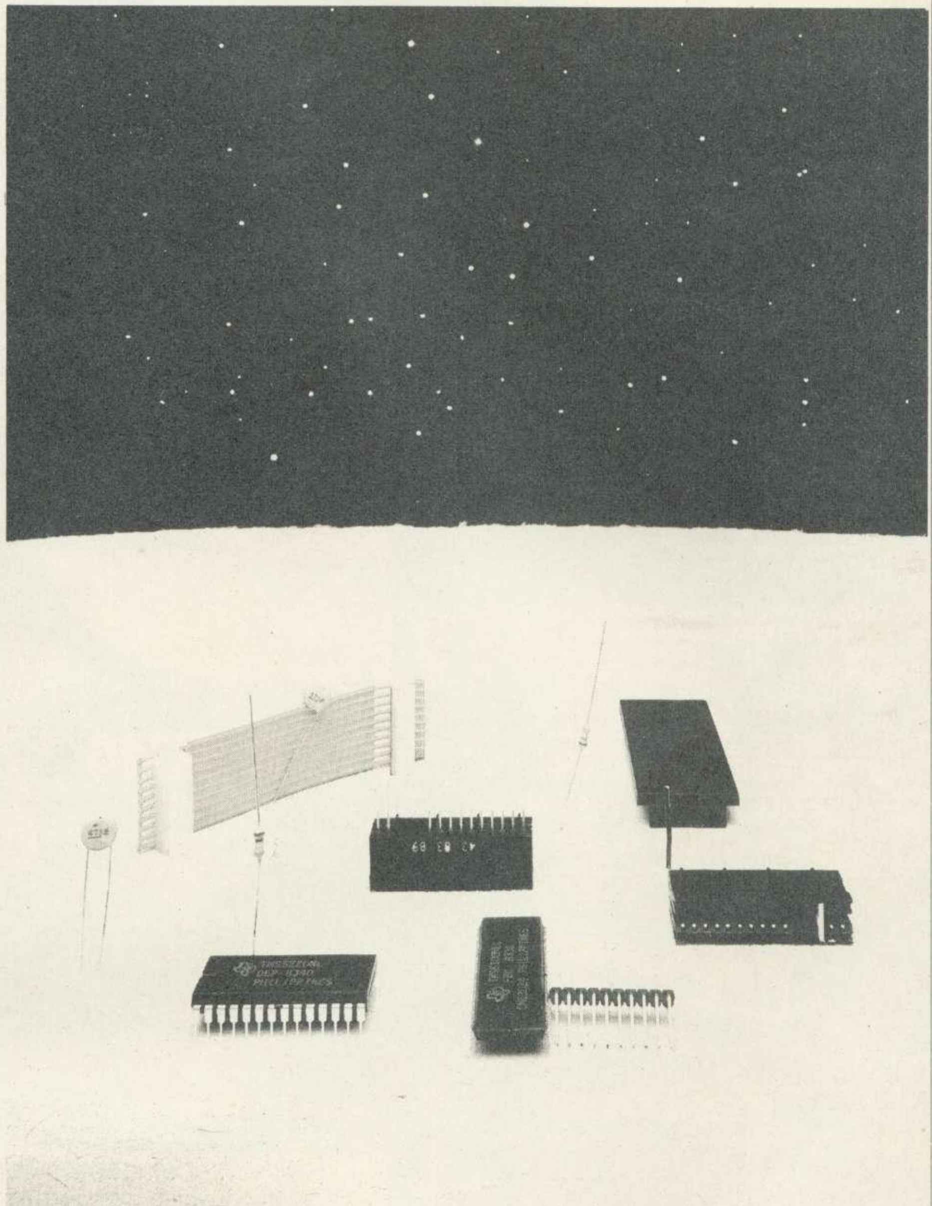
Its quality of speech makes it suitable for many uses, for example in education (especially for infants who are unable to read screen instructions), with handicapped people, in programs with overcrowded screens, or in software where it is inconvenient to watch the screen all the time.

The Namal Type and Talk speech synthesiser is expensive at £171.35, and its handbook needs to be rewritten. The quality of



The Namal Type and Talk needs no programming

speech is not as good as Computer Concepts' ROM, but it can be used with little programming effort and knowledge. This lends it to a variety of applications – again, use with handi-



The BBC Speech System offers high quality speech but has only a limited vocabulary

capped people comes to mind, where it would be expensive to rewrite existing software to use, say, the *Speech* ROM. The lack of quality, however, limits the range of possible uses – it's not good enough for infants.

Speech has been one of the most underdeveloped areas on the BBC micro – largely due to the very limited facilities of the BBC speech system and the poor quality of many of the alternative systems - and yet it holds considerable potential. The Namal Type and Talk adds a new dimension as it is an easy to program system that can be implemented with almost any software. The Computer Concepts' *Speech* ROM gives an on-board system at a reasonable cost and its quality is more than good enough for a wide variety of applications. This is the system I think will have the most potential.

Now the tools are available, we shall have to wait for applications and software to be developed to see how successful these systems will be in making effective use of speech.

BBC Speech System, £55
Available from Acorn dealers.
Computer Concepts Speech ROM, £33 + £10 for the speech processor if required
Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.
Namal Type and Talk speech computer, £171.35
Cambridge Microcomputer Centre, 153-154 East Road, Cambridge CB1 1DB.

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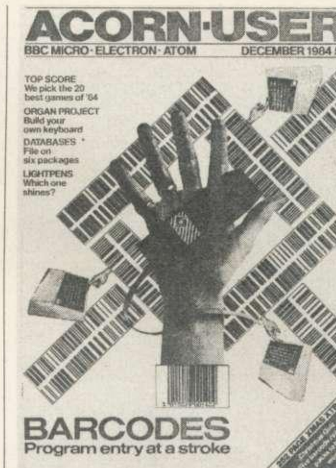
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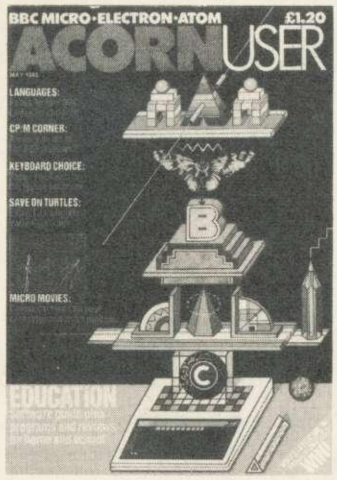
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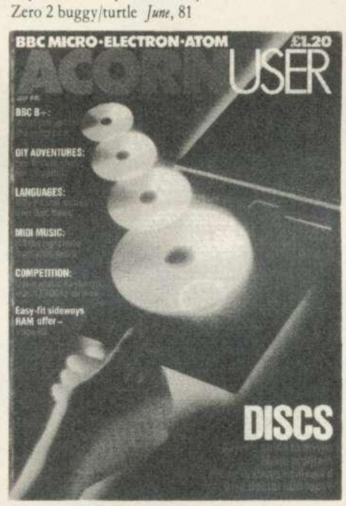
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BOOK REVIEWS



Synergy Software

'PROFESSIONAL Software for the BBC Micro'

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EASIPLOT

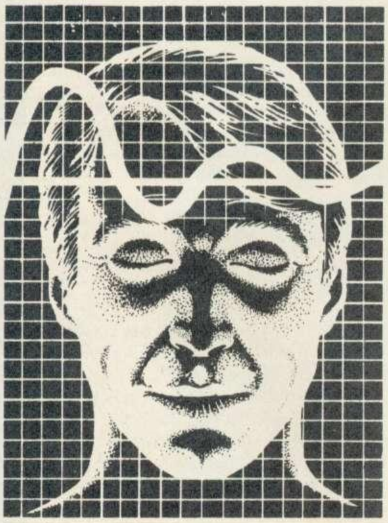
"a very good program" A + B Computing
"excellent" Which? Software Guide

Easiplot is a sophisticated and user friendly BUSINESS and EDUCATIONAL graph package. Voted the 14th best educational program, Easiplot has come to be regarded as an outstanding business package and excellent value for money.

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★5 line or bar merging
★Bar/Line conversion option
★Auto or manual scaling
★Comprehensive label and edit facilities
★Screendump for Epson compatible printers
★Save/Load options on single or dual drives
★Provides easy access to screendump ROM's
★Grid and screensave facilities
★56 page USER MANUAL

BIOGRAM

'This original and imaginative package is excellent value for money. . .it provides the user with a very cheap near equivalent of a dedicated professional system costing many times its purchase price.' A&B Computing (JUNE 85). "GOOD VALUE FOR MONEY" MICRO USER (NOV' 85)



BIOGRAM is a new concept in computer software and provides you with the tools to control your state of relaxation and response to stress.

BIOGRAM uses proven biofeedback techniques to provide you with audio/visual impressions of your physiological and psychological state.

Your stress level is detected by two electrodes and is converted and relayed to the computer by the electronic BIO-MODULE. The BIOGRAM software translates this signal into a form that will enable the user to learn to influence his own state of mind.

BIOGRAM is FUN and EASY to use, just plug in the module, attach the electrodes and choose your program. Ready to run in seconds.

The BIOGRAM system comprises an electronic bio-module fitted with plugs and electrodes and a suite of programs on disk or cassette. The bio-module is supplied in two versions:
BIOGRAM I – a standard, medium sensitivity unit
BIOGRAM II – a high sensitivity unit with a three-way sensitivity booster switch.

The BIOGRAM software package includes:
★RELAXOGRAM – a multi-level relaxation trainer and progress tester.
★LIE DETECTOR – a graphical lie detector with an automatic interrogation facility.
★P.REDUCER – a programmable phobia identifier and reducer.
The comprehensive user Manual provides many examples of biofeedback applications and experiments to try.

HARNESS THE POWER OF BIOFEEDBACK – LEARN TO CONTROL YOUR FEARS, PHOBIAS and STATE of TENSION. AN INVESTMENT FOR THE WHOLE FAMILY.

SHARE ANALYSER

'an excellent program' *Micro User* – Jan 85
'an invaluable aid' *Northern Echo*
'very highly recommended' *Which? Software Guide*
'Excellent investment' *Luton News*

Share Analyser is a comprehensive reporting, analysis and charting package for the BBC Micro. Transaction and share price databases are built up for each share name and a variety of report and analysis facilities can be instantly accessed. Reports can be produced on any printer. Share Analyser is easy to use and is supplied with a comprehensive Operating Manual.

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★Use as many disks as you require
★Capacity per disk – 20,000 whole number share prices and 320 purchase/sale/dividend records
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Easiplot (including Dataplotter – disk). .*BBC B & B+*	£24.95
Rapid Reader (disk only). .*BBC B & B+*	£27.95
Share Analyser (cassette). .*BBC B, B+ & Electron*	£17.95
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The latest release from Chalice software, over 60 commands on a 16K ROM. The range of commands available means that there is something for every BBC user. For the disc user the ROM provides a skewed formatter to speed up disc access, a disc sector editor, disc search, verify and repair utilities, a useful free space command, plus many other handy commands. For the BASIC programmer, commands include search and replace on a global or selective basis, list active variable values, append BASIC program, move and copy lines, bad program repair, a highly effective routine to shrink BASIC programs down to a far smaller size etc. Other commands include disassembly, memory edit, graphics compilation, comprehensive file transfer utility, function key lister, envelope lister, rom lister, rom save, full rom status, switches roms off through <CTRL><BREAK>, send commands straight to a ROM, KEEP command, inverse video command, a command to send codes direct to your printer, memory search, base conversion, display character definitions, close open files and many others. All commands have been chosen on the basis that they are useful and not as space fillers.

Introductory price £34.95

OVER 60 COMMANDS

the SCYTHE

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everthing from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

PRICE £24 INCLUSIVE

ROM MASTER

ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can be switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified b their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

As a bonus feature for anyone who has files they want to keep from prying eyes, ROM master contains the commands SCRAMBLE & UNSCRAMBLE which will encrypt or de-encrypt a file based on an entered password. The encryption used is highly sophisticated so unless you know the correct password the files cannot be read.

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COMPUTER & VIDEO GAMES ADVENTURE REVIEWS OCTOBER 1985

ENTHAR SEVEN

Enthar Seven is the latest adventure from Robico, and the most enjoyable and exciting that I have played to date.

BBC cassette owners — go out and buy a disk drive now. Disk owners read on, then go and buy the game!

The program comes in two formats, a twin disk pack for 40 track users, and a single floppy on 80 tracks. I played a pre-production version in the 40 track format.

On loading, a colourful title page invites you to either play the adventure, or to read other information about Robico. This is really rather good advertising, as the spare space on the program disk is filled with screen shots of other games. Inventive stuff!

A detailed introduction to *Enthar Seven* explains that you have, er ... "borrowed" a space hopper, and then realised that you can't fly it!

Things seem to be going well until the hopper's orbit around Enthar Seven begins to decay. That is the first problem. Getting off the space ship before you spiral into the planet is the second.

This is fairly easy to achieve, but when you end up in pitch darkness with just a space suit and helmet to keep you company, you realise that something is seriously wrong.

It took me about 20 minutes to sort that out, but once done, the fun really begins! The text is lengthy, interesting and incredibly atmospheric.

The game is truly huge, with 450 locations and 80 objects. I've only seen half of the objects, and cannot imagine what the rest consist of!

There is so much to say about the game in such a short space, that I'll have to give you only a brief idea of game play.

The planet is split into seven sections and by use of the teleport, instead of a clock as in *Lords of Time*, you can jaunt around the planet, solving bits of each section before making your way back to the metal cubicle.

It seems that each section can be partially solved with objects found in that sector, before coming across a more sticky problem.

I can't guarantee this, as the author Robert O'Leary has moved some of the objects around for the final version.

Remember the *Martian Chronicles* by Rad Bradbury on telly, with those wonderful shots of wind-swept plains, and huge Martian constructions? This is just what comes to mind when you find yourself staggering blindly through a barren wilderness with only eight moves before you explode!

There are caverns, houses, forests, swamplands, high-security areas, a barren wilderness, vast radiation poisoned wastelands, a dried-up lake, a river, and an acid pool, and even a storyline other than your own, about the Lorvox family.

I have yet to complete the game, having done about 73%, but am determined to do so. Let's face it — I'm hooked! One part I particularly enjoyed was sneaking up on an extremely unfriendly security camera and rendering it useless — great fun!

If your input isn't understood and you repeat the same command, the program will get quite upset! This is all part of the fun, and in keeping with the humour that runs throughout the game.

LOOK AT is permissible, along with many other sentence commands. This is particularly well implemented, for if the word following LOOK AT is not understood, the general surroundings are described instead. This is a lot better than a "I can't see a ..." message.

Typing USE (always a sign of desperation!) produces a very helpful message, and SCORE produces an hilarious one!

There is good use of Mode 7 colour (which can be switched off by people who like b&w eye strain!) and the INVENTORY and LOOK commands handle objects very well; a paragraph is presented instead of a long list — even AND is inserted before the final item.

You can do some very complex things with some of the objects. For example, should you need a vacuum cleaner, and find one that doesn't work, you will have to remove the bag and repair it with another object, and attach a power cell, before you can proceed with the task in hand!

The "nuts and bolts" of the programming are good, with useful commands such as "@BUFFSAVE" which will store your current position in memory. It works like a saved game on disk, but is much faster and very useful for poor old single-drive owners like me!

Unlike another disk adventure I recently reviewed, this one doesn't "hang up" if you have the wrong disk in at any time, it simply informs you something is wrong, and asks you to insert the correct disk before continuing.

The response times are not all that fast, and the longest is 24 seconds. However, all the commands can be abbreviated, and this speeds up the access time to an average of about five seconds.

Enthar Seven comes in a very professional looking package, with an SOS card, an adventurer's notepad, and detailed instructions, all titled with Robico's smart gold on black logo.

It's available for BBC B on disk only, from Robico Software of Mid-Glamorgan, and costs £17.95 for 40 track version, £16.95 for the 80 track version.

Jim Douglas

● Personal Rating: 10 doesn't start to say it!

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FREE ADS

ATOM with 16k RAMboard, VIA, Ross utility EPROM, Wordpack EPROM, much software including Forth, B/W monitor, tape recorder. £80. Tel: Chatteris (Cambs) 3161.
MIKE BARWISE is looking for second-hand Atoms. If you have one, contact him by sending a postcard to the AU office.
INTERESTED in exchanging ideas, tips, programs, etc., on the BBC B. Write to P Davis, Riverslea, 1 Meades Lane, Chesham, Buckinghamshire HP5 1ND. Will reply to all letters.
TWENTY-FIVE computer cassettes for sale. I've now got discs. If you're a new BBC cassette user this offer could be too good to miss. Phone for details on Shaftesbury (0747) 2627.
ATPL SIDEWAYS ROM RAM board allows 16 ROMs, plus manuals £25 ono. Also ROM chips Wordwise, Disc Doctor, Graphics Extension, Exmon, Beebug Toolkit, Beebcalc. All with manuals, £15 each ono. Langport 250130.
JUKI 6100 daisywheel printer £280 ono, 6502 2nd processor £160 + View, Graphics, Printmaster, Fileplus, ROMs. Wanted digitiser, video camera, modem, plotter. Phone 051-638 7466.
WANTED: February 1985 Acorn User magazine in good condition. Will exchange for November 1983 Micro User magazine or Acorn DFS chip plus cash adjustment. Tel: 01-647 8834 after 7pm.
EPROMS for sale all ex project erased and tested 2716, 2516, 2732, 2532 and 2764. Please phone Don after 6pm on 0843-33398.
MUSIC 500 wanted for BBC. Tel: Tenby 3004.
BBC B 1.20 OS, Acorn DFS, 200k disc drive 40/80, Acorn + Cheetah speech chips, joystick, software including Elite, Revs, B + W TV, BBC cassette recorder BBC mags (40+) + books, offers £400-£500. Mr D C Ho, 40 Berry Street, Liverpool L1 4JQ.
SMITH Corona TP1, daisywheel printer, hardly used, spare wheels and ribbons, fully working £100 ono. Also IEEE interface. Tel: Wickford (03744) 66595 after 6.30pm.
FOR SALE: Prism acoustic coupler. Compatible with Micronet. 1200/75 baud. Micronet software on cassette. Transferable to disc easily, £35 quick sale. Tel: Stamford 720530. Paul Logan, 20 Timbergate Road, Ketton, Nr. Stamford, Lincs. PE9 3SW.
BBC B 1.2OS, graphics ROM, Quickshot joystick, cassette recorder, lots of software, mostly best selling games. Magazines, books and leads, £260 ono. Bungay 4396. Ask for Richard.
BBC B Pascal, Lisp, View, Wordwise, expansion board, Cannon NLQ printer, high resolution colour monitor, Mouse, recorder, joysticks, many games, Acorn magazine since 1983, hardly used, worth £1550, only £1000. 01-452 3878, after 6.30 pm.
PEN PAL required in Scotland to swap own programs hints etc. Contact: C Murphy, 30 Cherrytree Gardens, Balerno EH 14 5SP or phone 031-449 2277 after 7pm and ask for Craig.
SYDNEY, Australia BBC and Electron user wants to hear from other Acorn users! (Especially those from Ryde area). Write: Stephen Knox, 5 Woodbine Crescent, Ryde, Sydney 2112. Tel: 80 3911 (Crowy + Chow!).
DISC DRIVE. Olivetti FD501 40 track. Very reliable full height, 5¼" for BBC. Very nice disc eject mechanism. Complete with cables and beige case. £40 no offers. 01-500 3737 evenings after 7.30 pm.
VOXBOX, speech digitiser and recognition system for sale. Normally £95, now only £50 including all software and manual. Tel: Bradford (0274) 44409.
TELETYPE printer with RS232 cable to BBC micro. Good condition, £20. Tel: Stevenage (0438) 359677.
EXCHANGE part/all of my Hi-fi system for NEC PC8201 Lapheld or similar system or BBC system or peripherals (monitor, printer, etc). Could possibly deliver certain areas. Alloa (0259) 214071. Scotland.
BBC B 1.2OS + DFS with 100k Teac disc drive, ATPL ROM board, Exmon II, Disc Doctor, disc software including Revs, Elite, joysticks, data recorder, and Beebug subscription, offers around £450. Tel: Cheltenham (0242) 513576.
ATOM factory built, 12k RAM, 8k ROM 6522 VIA + printer interface + all leads/manuals. Some software, lots of mags, offers? Tel: (09592) 2391.
BBC B + Acorn DFS + 100k 40 track disc drive slimline + joystick, games and manuals + Wordwise, Island music system & Elite. Also Philips colour TV 14". Both 1 year old. All for £700 ono or split. Phone Tony evenings 01-337 8893.
ATOM wants Teletext VDU card, Acornsoft Forth, Database, synthesiser, Life, maths pack one, desk diary, games pack four, adventures, BBC basic board, any utility ROMS, User group newsletters. Reading (0734) 882354 evenings.
WORDWISE chip and manual for sale, £20. G Cassell, 96 Oakdale Close, Ovenden, Halifax, W Yorks HX3 5RP.
BYTE magazine back issues wanted. Large number of American computer magazines available to exchange or sell (s.a.e list). Geoff Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.
CUMANA double-sided 400k drive, own PSU, complete with manuals, utilities disc and over £300 of original software, sell for £85 ono. Tel: 01-689 9619 after 6pm and ask for Smit.
OPUS drive, single sided 40 track with integral power supply, includes manual and over £180 of original software (mostly educational and business). £160 ono. Telephone 01-689 9619 and ask for Smit.
ZX81 16k, boxed, joystick, interface, Filesixty keyboard, vgc. Will split, £25 ono. Tel: Enfield 01-363 0039. Phone evenings or weekends.
PENPAL wanted to exchange ideas, programs etc for the BBC. Every letter replied. Write to K Varia, 6 Black Horse Lane, Walthamstow, London.
PRESTEL modem, Nightingale complete with Commstar ROM. Both unused only £65. Vero Eurorack plus Eurocards, connectors £15, Veroblock Prototyping Eurocard £8, Speach Eurocard magazine project, working £8. Tel: Glos 417613 evenings.
WANTED: Commstar modem or similar. Will swap for Aquarius colour computer, one game, books and manuals. Write or phone, Terence Sandiford, 16 Romer Street, Bolton, Lancs, tel: 391272.
WANTED: 100k disc drive, Acorn DFS upgrade, and penfriend. All offers considered. Write to: Paul Tang, 21 Main Street, Branston, Burton-on-Trent, Staffs DE14 3EX. Tel: (0283) 65635.
Z80 second processor, complete with all software, virtually unused, boxed as new, £275. Phone Bedford (0234) 54374.
DISC drives. Pace 400k double sided, double drive, 40 track, double density compatible. Over £100 software, Elite, Revs, wordprocessor etc. Perfect, as new, only £400. Telephone Heywood (0706) 69727.
DFS Computer Users Club ROM (1.00). Fully Acorn compatable supplied by Viglen. Tel: John (0706) 524228, £20 ono.
BBC model B with Acorn DFS, 32k sideways RAM and new 40/80 track D/S Viglen drive also joystick, lightpen, Wordwise, View, Disc Doctor, Elite and more, £320. Phone Steve on Willenhall 637297.
ACORN Electron, Acorn data recorder, three games (Monsters, Snooker, Chess), education package and books. Good condition, hardly used. £100 or nearest offer. Bevis Gooden, Tel: Wolverhampton (0902) 710426.
BBC B + Acorn DFS, Basic II + 128k Solidisk, Mitsubishi d/sided 40/80 switchable, Grundig 14" TV/monitor, Integrer inkjet printer plus Minor Miracles WS2000 modem £1500. Phone 01-940 0271 weekends or evenings after 9pm.
TANDY CGP115 4-colour printer plotter. As new, hardly used, £75. Tel: 01-699 2987 (evenings).
MODEM, Miracle Technology WS2000 c/w autodial, autoanswer, software control, all leads, software including Commstar Termi II communicator, £280 ono. Also BBC B + 20k Aries B20 £295 ono. Microvitec Monitor £180. Phone (0787) 71606.
WATFORD speech synthesiser. Unwanted gift, complete with ROM, manual and unit for only £20 ono. Tel: (0582) 575354.
WANTED: Issue 4 or 7 BBC B with DFS in fully working order. Extras considered. Fair 'Trade In' price offered. Acorn Z80 second processor also wanted. Bournemouth (0202) 529787.
PRINTER-PLOTTER MCP40 £65 ono. Eprom programmer HCR Micron £40 ono. Philips tape recorder EL3302A (7.5 volt) £5. Spreadsheet by Contex £10. Wanted flat bed plotter. Bournemouth (0202) 529787.
ACORN Electron and Plus-1 software, Slogger Systems Rombox + Vulcan joystick interface. Worth £485. Sell for £250. Contact Tim Everett, 292 Craven Park Road, Stamford Hill, London N15 6AN.
ITEL 1021. Purpose-built golfball typewriter and RS232 terminal. Interfaced to BBC computer via printer connector. IBM Selectric 10 pitch mechanism. High quality computer copy. Nice typewriter when offline. Bargain £135. Tel: 01-451 0520.

Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.

OKI MICROLINE 80. 80 cps matrix printer, good condition, £80, or may consider trading for other hardware. Telephone 01-249 0035.
WATFORD ROMs, Print, Beebfont, Transferom, Starstick II joystick and 2+ ROM Watford light pen and 40-track disc. Microsystem proportional joystick, £65 the lot. M Knight, 3 Rassey Close, Standish, Nr. Wigan, Lancs. Tel: Standish 426784.
ISO-PASCAL Need help? Bored? Or just looking for ideas and tips? Write to Chris McIntosh, 86 Manley Road, Whalley Range, Manchester M16 9ND. You will not be disappointed.
PENMAN Robot Plotter: hardly used in original packing with cable, manual and software. Best offer around £200. Telephone: Mike Robinson (Sheffield) 0742 342870.
SLOGGER ROMbox for Acorn Electron. Original packaging and less than one year old. Space for eight ROMs. Good reason for sale. £30. Phone Julian on 0942 813416 (after 7pm please).
ATARI 400 Dedicated cassette recorder, power supply, joystick, 4 books inc. Manual £60 ono. Tel: Mr G W Gill (0702) 614302 (evenings).
SPANISH BBC user needs contact with users of Basic extensions (Micropower) and also Acornsoft Logo. Exchange ideas in soft & hard. Contact: Chemi Pena, P.O. Box 140, Erandio, Vizcaya, Spain.
ACORN DFS kit £80. PL Digitiser £75. Torch Z80 2nd processor card £225, Caretaker ROM £18, Printmaster ROM £18, Ultracalc ROM £30, View ROM £30, Microtext £30, RH Lightpen 2 extra tapes £30. S. Pascal £10. 0327/703792.
BBC BOARD and 64k memory for Atom plus some software and books £30. Alan Foukes, 13 Danvers Road, Mountsorrel, Leics LE12 7JG.
WANTED BBC B micro. DFS preferred but not essential. Could offer Commodore system with printer and dual disc drive as swap (worth £550) or will pay cash. Tel: Chester 675717.

We've changed the format of the Free Ads so that we can clear the backlog and no longer have to carry ads over from one issue to the next. The Free Ads are carried in the magazine as space permits, so please allow about two months for yours to appear.

FREE PERSONAL AD SERVICE

Sell your old hardware or pass on information. Fill in the form below to a maximum of 32 words (one in each box) and send it to Acorn User Free Ads, 142-143 Drury Lane, London WC2B 5TF. Please use capital letters, write clearly, and remember your name, address or telephone number. Without this full information, supplied on a separate sheet of paper, we regret that we cannot carry your Free Ad. This is a service to readers – no companies please. One entry per form only, and we cannot guarantee any issue.

ACORN USER ADVERTISEMENT PAGES – APRIL ISSUE

ERRATUM: PRINTERLAND ADVERTISEMENT MARCH ISSUE

Due to an error, the text (ex demo models) was omitted from the item Canon 1080A on page 153 of that issue. This was through no fault of Printerland and we apologise for any confusion caused.

SMALL ADS

■ **Devon County Council.** County Supplies Department. BBC microcomputers and peripherals. Tenders are invited for the supply of the above. Tender forms from County Supplies Officer, 2 Trusham Road, Exeter EX2 8RB. Tel: 53407

■ **BBC B, DFS,** 56k Aries ROM/RAM boards, 200k twin drive, Acorn teletext adaptor, Disc Doctor, Wordwise+, View 2.1, Monitor, Intersheet + software. £700 ono. Edwin Kunz, 24 Ochil Road, Alva, Clacks. Tel: (0259) 60924, anytime.

■ **New BBC B** board 7, December '85, guarantee 4 months to run. Fitted with Solidisk 256k sideways RAM, Acorn DFS, Solidisk DDFS and Wordwise+, manuals. £425 for quick sale. Tel: John on Orpington 37955.

■ **Centronics 739** printer ROM dumps colours, shaded, *command, printer control, Wordwise fkeyset, manual, utilities (tape/disc) £25. Electrocomp, 5 Polden Close, Farnborough, GU14 9HN. (0252) 510486.

■ **Acorn Z80** second processor with *latest edition software* and manuals. Complete and in mint condition. £250. Tel: Ascot (0990) 25868.

■ **Braille** printing, hand readable, BBC compatible, multiple character sets, braille/print switchable. Blind programmer utilities in ROM. Details: Malcolm Girling, 130 Suez Road, Cambridge.

■ **Electron,** Plus 1, Plus 3, ROMs, discs, tapes, books, magazines, all perfect condition. The lot: £300. Telephone day: 01-482 5151, evenings: 01-263 9877, and ask for Ray.

■ **Electric car** design software. Menu driven for BBC B/Electron 32k. 'Excellent tool for serious student'. £6.95. Margetts, 7 Montgomery Square, Eaglesham, Glasgow G76 0AB.

■ **6502** second processor for sale. With Hi-Basic, DNFS and manuals, good condition. £140. Phone Paul on 01-688 4811.

■ **Music programs for the BBC,** including Ghostbusters, Locomotion, Only You & A View to a Kill. £6 per disc, £5 if you send your own. 4 discs, no. 5 available in April. Send SAE to Byte the Apple, 84 St Georges Road, Aldershot, Hants GU12 4RJ.

■ **Double density** upgrade boards, +1.1 DFS and documentation, 8271 conversion sheets available, £25+p&p, or exchange. Phone Tim after 6pm on (0623) 758448, or Steve on (0773) 719712.

■ **Sideways RAM** turned into 16k printer buffer. Includes other utilities on ROM for only £7. Prometheus Computing, 125 Stainburn Crescent, Leeds LS17 6NB. BBC OS1.2.

■ **Expansion unit** which provides four extra user ports via 1MHz bus. £60. Sae for details. W M Automation, Unit 18/213, Kilroot Park, Carrickfergus, N Ireland. Tel: (09603) 61955.

■ **BBC B** with 400k drive, 6502 second processor, teletext adaptor, tape recorder, APTL sidewise, ROMs and software. £850 ono. Tel: (0675) 81768 (Warks). Will split.

■ **Spellcheck I/III** – increase dictionary size. Up to 25,000 words from my files. State 40/80 track disc required, £5.50. G Lawson, 47 Hall Park Avenue, Horsforth, Leeds LS18 5LR. (0532) 585597.

■ **ADLAN** adventure games language. All gaming actions possible. Over 1300 different rooms. Complex adventures or simple ones. Disc £18. P C Soft 01-761 2087, 25 Farquhar Road, London SE19 1SS.

■ **WS2000** owners! Save yourself £24 with this amazing utility! Fully automatic dialling, on standard WS2000. Autodial board not needed! Only £5.95 from ZakSoft: (0533) 387128.

■ **Torch** Unix/CP/M system – use Unix over Econet. Includes: Torch Unicorn, BBC B, Zenith monitor, MT80 printer, MBasic, Superfile Database. All 6 months old, £3500 ex VAT. (0222) 28687.

■ **Mighty MAGMA.** Powerful disc-based m/c monitor for BBC B. Full memory view and edit commands, search and replace strings, etc. Unique binary display/ change and magic cursor; *SECT and *MERGE splits and merges up to 8 program sections simulataneously! Cost: £18.50. State 40t or 80t. (ROM version: sae for details.) D J Kelly, 84 Newhouse Drive, Kilbirnie, Ayrshire.

■ **Titan.** A superlative game-aid program for fantasy role-playing addicts. Titan creates characters for players of AD&D. Fast, detailed and comprehensive. Save characters to disc or printer. Full details or orders available from: Goldsoft, 42 Hallmores, Broxbourne, Herts. Cheques for £13.95 (80t) and £12.50 (40t) to Ducalplex Ltd.

■ **Games** games games games games games games games games games games games games games games games games. 20 games on the BBC B micro for £7.99, something for everyone. Arcade games, card games, strategy games and adventure games. Features include machine code, high-res multicolour graphics, sprites, etc. Buy and you won't be disappointed. Tape or disc versions available for the ridiculous price of only £7.99. Send cheque to: Scarabsoft, 30 Woodfields, Briston, Norfolk NR24 2JY.

■ **Liquidation sale:** BBC model B + DFS £199. BBC model B plus: (64k) £299, (128k) £339. Acorn 2nd processors: 6502 £109, Z80 £209. Cumana drives: CD800/S £159, CS400 £79. Epson printers: FX80 £179, LX80 £139. Microvitec monitors: 1431 £119, 1451 £169. Prices include VAT, postage and packing. Cheque or Access/Visa details with order. Piet Simon (SPH), W ivenhoe Park, Colchester, Essex CO4 3UB.

■ **Listings!** No printer? Then for program or data printouts send tapes or 40/80 track discs to C McIntosh, 86 Manley Road, Manchester M16 9ND. 75p + 5p per 30 lines.

■ **Discount printers,** full manufacturers warranty, fully inclusive prices. Taxan KP810 £231; Taxan KP910 £396; Seikosha SP1000A £215. Others available. IGA Computer Services, (0494) 451103.

■ **AC Circuit Analysis.** New program, menu driven, 30 nodes, transformers, frequency sweeps, pulse response, alternative values, £60. Details from Markie Enterprises, 17 Percy Road, Shepherds Bush, London W12 9PX.

■ **New wordprocessor** for BBC micros, on-screen underline, italic, etc, special mode for TV scriptwriting. Only £17.50 (5¼" 40T disc, 20pp manual, p&p) or sae for details from M Scarlett, Stable Cottage, Berry Hill, Taplow, Maidenhead, Berks SL6 0DA.

■ **BBC B,** 400k drive, STL-DFDC, Tandy VII printer, sidewise, Wordwise+, AMX, Replay, ISO-Pascal, Revs, Elite, Repton, etc. All guides, books. £700 ono. Tel: A McCulloch (0279) 54266.

■ **For hire** BBC and Amstrad computers and peripherals. Computer Hire Services, 294a Caledonian Road, London N1 1BA. 01-607 0157 or 01-997 6457.

■ **Teltext.** A superb screen-based database for BBC with disc drive. Designed in the classroom, it is ideal for use at home, in the office or at school. Available from Goldsoft, 42 Hallmores, Broxbourne, Herts. Tel: 467957/445886. Cheques/POs for £14.95 (80T) and £13.50 (40T) payable to Ducalplex Ltd.

■ **Mature enthusiasts,** perhaps teachers, needed for involvement in marketing and support of state-of-the-art package for retail sector. Must own BBC B (or +), disc and colour monitor. Based in the following broad areas: Edinburgh, Newcastle, Leeds, N Wales, Cardiff, Bristol, Kent, Essex, Surrey, S Coast, Reading, London NE and SW. Phone (02606) 389.

■ **Mr Floppy Disc.** The Universal disc will work reliably on *any* drive. D/S D/D 96tpi 80 tr. 10 for £15, 25 £35, 50 £65, lifetime warranty. NWL Computers, 10 Pennine Drive, London NW2 1PB. Tel: 458 1491. Kaga printer £273. BBC Master 128k £375. Unbranded discs D/S 80tr, 10 for £12. All UK charges included.

We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software

■ **Problems?** R-SOFT utilities can help you! **1. How-to:** An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. **2. Nutcrackers:** tape2tape + tape2disc + disc2disc + disc2tape. **3. Rompull** and **Tapedump. 4. Automatic Disc Menu:** Includes a sideways RAM version, can boot from ROM, works with 2nd 6502. **5. Autosol:** Will automatically boot your Solidisk with a preselected list of ROMs. **6. SWROM*:** puts your Basic/machine code programs in ROM format. **7. RFS-Generator:** Generates ROMs for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5 each; **How To + Nutcrackers:** £9. **D-Master:** Superb disc copier (is unprotected): £7. Many other utilities: Send for our list (SAE please). R-SOFT, 22 Marriotts Close, Felmersham, Bedford MK43 7HD. Tel: (0234) 781730.

■ **Triple** contains Twin to back-up valuable protected discs, Digger to display format information and contents of all readable tracks (and alter it if desired), and Dual to create your own 40/80 track discs. £10. Twin alone, £7. John Connett, Dene Croft, Westcott Street, Westcott, Dorking, Surrey RH4 3NY.

■ **Maths Marvels** graphic demonstrations at *Scientific American* level. State 40 or 80 track disc. Not for Electron. £6 cheque/PO to D Mc- Quillan, 12 Keldholme, Bracknell, Berks RG12 4RP.

■ **School Software Ltd:** Econet discs for £12.95, cassettes £8.95. Offer lasts one month only. Chemistry (12-16), Biology (12-16), Physical Geography (12-18), Better spelling (10-14). Viewing at MEP Centres. Send cheque to 69 Meadowvale, Raheen, Limerick, Ireland (353-61 27994).

SMALL AD SERVICE

Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 142-143 Drury Lane, London WC2B 5TF. Please print clearly.

FLEECEBUG NEWS

COMIC CONRAD'S CAPER

Reader Conrad Gempf from Scotland spent 40 minutes typing in the Touch Screen Utility from last year's April issue. Conrad obviously appreciated Professor Bruce Smith's utility and it convinced him that *Acorn User* had a sense of humour. His reply was a set of cartoons, one of which we publish below (we must have a sense of humour?).

LEADER OF THE HACK PACK

Response to Acorn's new BBC Master in the Press was lukewarm, to say the very least. Leader of the pack in the 1986 Jane Bird Friction Award category is, so far, Jibbering Jack Schofield from the Groaniad who had a real go at the new micro.

Never mind, he's the one whose pages claimed you couldn't do fractals from Basic (look out for some brilliant Mandelbrot manipulations next month, Jack).

P.S. Was it the same Jack that did the Sinclair 128 review as did the Master 128?

THE NEWS

★ The *Acorn User* stand at the recent Hi-Tech show narrowly escaped demolition when the trolley carrying an enormous lathe collapsed. It gouged a hole in the steel reinforced carpet and slammed against the stand. Luckily, no-one was hurt.

★ An *AU* contributor had to cancel a meeting recently because of an incident with the mains. He was reported to be very shook up.

★ Another nasty incident overtook an Acorn spokesperson while talking to an *AU* reporter on the phone. The poor person just couldn't halt an embarrassing bout of the hiccups!

★ Quote of the Hi-Tech show: 'Have they re-written the wotsits so that the wotsits now work?' – David Atherton, BBC.

★ It's astonishing how many people don't know how to use disc drives so we've signed up a great deal with Cumana. If you write to Cumana direct they will give you a copy of their disc drive guide for free.

ACORN STAMP ON SYSTEM

Acorn has now given its approval to RamIt, Fleecebug's new filling system. The system has been allocated the official filling system identity code – &0BAD.

The new system allows you to place all the stamps from letters of complaint inside your micro.

This is unlike other similar filling systems, which leave letters of complaint from disgruntled readers in full view so you have no choice but to attend to them.

RamIt places them completely out of sight so that you can totally ignore them. RamIt is simple to use. Just type *PONTIFICATE and it'll do the rest for you.

YET MORE ABUSE

Acorn User has been saying nasty things about us and we will not stand for it.

Their comments are somewhat puzzling when *AU* publishes letters from its own disgruntled readers. Our solution to this is never to mention any complaints we receive because it might put people off buying our products.

So we'll carry on publishing all the nice things people say about us and making people pay for the privilege of having yet more advertising junk mail like this through the post every month.

We can say any sort of drivel about anyone we like and carry on misquoting them. But we want and we demand to have the last word. So lets (sic) hope that this is an end to this illiterate silliness.





COLLECT THE PUZZLE PIECES

THE PUZZLE PIECES IN POSITION

CLOSE-UP OF A MONSTER

DODGE THE METEOR SHOWERS

WATCH OUT FOR THE BLIND SPIRITS

ACORN ELECTRON VERSION

REPTON 2

REPTON met with unanimous acclaim from games players and reviewers alike. Now, totally redesigned and rewritten, we bring you a new experience... REPTON 2 — a challenge even for hardened REPTON addicts! Not only must you collect all the diamonds (more than a thousand in total), you must also find the 42 jigsaw puzzle pieces which have been strewn throughout the 16 levels. The levels of play, each 16 times the size of the TV screen, are connected by a series of transporters which propel you backwards and forwards between the different scenarios — but each transporter can only be used once. Each level has its own characteristics: brave the meteor storms at the planetary surface; entice the haunting spirits into their cages by strategically positioning the boulders; avoid the eerie skulls of past explorers; unlock the safes with hidden keys; and crush the fearsome monsters which hatch from giant eggs. Can **you** complete REPTON 2?

ACORN ELECTRON

BBC MICRO

MORE PRIZES!

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AN EXCITING KARATE CHAMPIONSHIP GAME

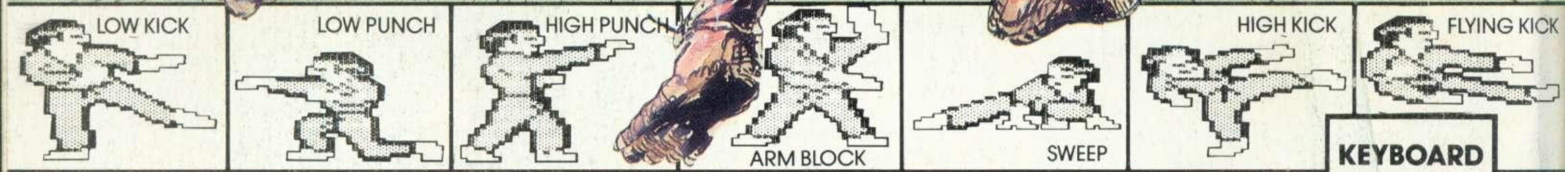
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KARATE COMBAT



THE INTRODUCTORY RITUAL

IN MID BATTLE



KEYBOARD

JOYSTICKS

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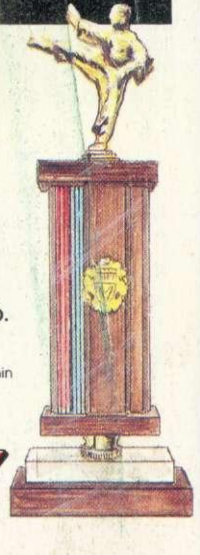
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Set in the realm of the mystic Orient, Karate Combat pairs you, in thrillingly realistic battle, against 16 of the mightiest and most skilful exponents of "open-hand" fighting. Each opponent has different fighting characteristics and you must cunningly use different techniques to tackle each adversary. Your aim is to move up the rankings and eventually do battle against the 16th opponent, the ultimate challenge — The Master! In addition to the competition mode, the program includes a 2-player mode and a practice mode, complete with a punch-bag, to enable you to master your repertoire of punches, kicks, blocks, spins, sweeps and the spectacular flying kicks.

PRICE: £8.95 (cassette), £11.95 (BBC disc)

COMPETITION COMPETITION COMPETITION COMPETITION

COMPETITION — If you defeat The Master you can enter our competition with a chance of winning an impressive trophy (pictured on the right) and the cash prize of **£100.** Closing Date: 30th September, 1986.



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